*Report to*

## U.S. Department of Energy

## Office of Engineering and Construction Management

# External Independent Review (E.I.R.)

*Of The*

## Rocky Flats Integrated Closure Project Baseline (ICPB)

*At The*

## Rocky Flats Environmental Technology Site

Golden, Colorado

*Submitted*

**June 2001**

*By*

**Burns and Roe**

*Achievements in engineering and construction since 1932*

# External Independent Review (EIR)

*Of the*

# Rocky Flats
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## Rocky Flats Environmental Technology Site
## Golden, Colorado

*For the*

## U.S. Department of Energy

## Office of Engineering and Construction Management

*Submitted by*

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**June 2001**

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## *EXECUTIVE SUMMARY*

From 1952 until 1989 the Rocky Flats Site had a key role in the production of nuclear weapons.

With cessation of production activities in 1989, the planned future for the site has evolved to its current planned approach of achieving Interim Closure by December 15, 2006. Within this context "Interim Closure" means that all deactivation, demolition and planned environmental cleanup work is completed, and the only continuing work is long-term assurance monitoring.[1] This monitoring will be accomplished as part of a project separate from this project (i.e., as part of the follow on Long Term Stewardship Project).

The weapons production activities at Rocky Flats consisted primarily of refining and machining non-irradiated Special Nuclear Materials (SNM) and fabricating final weapons components. Residual hazards associated with execution of site closure, therefore, are largely attributable to potential ingestion of Plutonium (Pu) and Highly Enriched Uranium (HEU) materials, and having to handle hazardous wastes, toxic wastes, low-level radioactive wastes, and mixed wastes.

In evolving to its current planned approach, significant progress has been made. For example, in 1995 a planning estimate was developed for what it would take to close the site, and it was estimated to cost in excess of $37B (non-escalated $'s; over $60B escalated) [2] and be completed by 2060. The current plan is based on a contract entered into by DOE and Kaiser-Hill (K-H) that became effective in February 2000. Table 1 shows the funding planned for the contract period of February 2000 through December 15, 2006. For purposes of comparison, when adding prior years costs from 1995 through January 2000 to the $4.426B of Table 1, the total cost is approximately $7.5B, escalated (versus $37B non-escalated and over $60B escalated), and the completion date is December 15, 2006, versus 2060.

**Table 1; Closure Project Baseline Annual Funding[3] ($000's)**

| | FY 00 | FY 01 | FY 02 | FY 03 | FY 04 | FY 05 | FY 06 | FY 07 | Total |
|---|---|---|---|---|---|---|---|---|---|
| KH Closure Project (Target Cost) | 399,778 | 613,625 | 613,625 | 614,225 | 614,825 | 615,825 | 445,110 | 45,988 | 3,963,000 |
| KH Incentive Fee | 16,404 | 24,575 | 24,575 | 24,575 | 24,575 | 24,575 | 188,432 | 12,288 | 340,000 |
| RFFO Support | 12,533 | 18,800 | 18,800 | 18,200 | 17,600 | 16,600 | 16,300 | 4,100 | 122,933 |
| Total Funding | 428,715 | 657,000 | 657,000 | 657,000 | 657,000 | 657,000 | 649,842 | 62,375 | 4,425,932[4] |

[1] The current cleanup requirements are specified for various radioactive and hazardous wastes by the Rocky Flats Cleanup Agreement (RFCA), a legally binding agreement among the US Environmental Protection Agency (EPA), the Colorado Department of Public Health & Environment (CDPHE), and the US Department of Energy (DOE). RFCA provides "interim" cleanup action levels, which also serve as interim cleanup requirements. Proposed final requirements are scheduled to be established by the end of this CY, and could be more stringent than the interim requirements. This could increase the K-H contract scope.

[2] Reference "Baseline Environmental Management Report" (BEMR), dated 1995.

[3] Table 1 reflects funding assumed in the K-H contract at the time of contract negotiation.

[4] Within DOE, FY 97 is the start of the program wide Paths to Closure Life-Cycle Estimate. If this approach is used, DOE Headquarters calculates the life-cycle cost to be $6.7B.

Although significant progress has been made to expedite site closure, there are many challenges to meeting the target baseline cost and schedule. One of the challenges is the role DOE must play. More specifically, in addition to its traditional role of client/ contract over-sight, DOE must execute significant activities in direct support of the project. These activities consist primarily of supporting SNM and waste shipments to receiver sites[5], and pursuing required regulatory activities. Also, DOE has a safety over-sight responsibility, and in exercising this responsibility, it plays a key role in establishing safety requirements and in overseeing work planning and execution for compliance with these requirements.

Recognizing the complexity, and interdependence of K-H and DOE activities, DOE is developing an "Integrated Closure Project Baseline" (ICPB). To better assure DOE's ability to execute to this baseline, the Rocky Flats Field Office (RFFO) Site Manager requested that the DOE Office of Engineering and Construction Management (OECM) provide an External Independent Review (EIR) of the Integrated Closure Project Baseline (ICPB). Burns and Roe was contracted by OECM to perform this review, and this report documents the results.

The cost estimate is reflected in Table 1. In looking at the DOE portion (i.e., RFFO support)[6] it should be recognized that activities not included in this baseline are (a) the costs of providing the RFFO staff and its other support subcontractors (≅ $30M/yr)[7], (b) the costs of the EM-33 Staff and its support contractors and (c) funding required by repository sites to plan and execute work required by them to enable their receipt of Rocky Flats SNM and wastes (≅ $6M to $7M per yr). Although not reflected, since these activities are critical to the success of the project, the EIR did include review of the scope and planned execution of these activities.

**EIR of ICPB; Summary Observations and Recommendations**

Significant challenges have arisen since the February 2000 start of the current K-H contract. For example, SNM is to be stabilized and packaged through the Plutonium Stabilization and Packaging System (PuSPS), and startup and operation of that system has been delayed by a year. Information provided to Burns and Roe indicates that operation of this system is on a critical path and is impacting Protected Area closure, but is not yet delaying the 2006 baseline closure date. Another significant challenge is that changes to the Waste Isolation Pilot Project Waste Acceptance Criteria (WIPP WAC) has

[5] DOE's support of shipping SNM and wastes to receiver sites is a complex task. It involves obtaining support from other DOE sites (a) to certify shipping containers for carrying materials whose characteristics are not necessarily bounded by existing certifications, (b) to obtain changes to RCRA Part B permits to receive wastes whose characteristics are not necessarily bounded by the existing permits, (c) to obtain various types and quantities of shipping containers from the DOE complex to meet shipping requirement dates specified by K-H, and d) for some sites, to prepare the sites (via changes to the facilities and/ or operations) for receipt of the materials.. These items are termed GFS/I (Government Furnished Services and Items).

[6] Within this context, RFFO Support consists primarily of (a) Litigation Support (budgeted at ≅ $5M/yr), (b) Site Utilities (budgeted at≅ $8M/yr), and (c) grants to the state of Colorado (budgeted at≅ $3M/yr).

[7] This is funded by "Federal Program Direction" funds.

wastes that had already been packaged for shipment, plus performing more extensive characterizations on the remaining TRU wastes. In addition, and due in large part to facility surveillance and monitoring requirements being based on facility operating license types of requirements, the facility landlord costs and other support costs for maintaining and assuring compliance for these facilities is significant. Any delays, therefore, in accomplishing the required closure work can result not only in a stretch-out of the schedule but also in significant increases to the facility maintenance/landlord costs.

In spite of these problems, opportunities for cost and schedule reductions also exist. For example, the review of the costs and schedules for the KH required activities reveals that the manner in which work has been planned appears to result in much more conservative cost estimates than what one would expect when compared to commercial nuclear facility environments. It is believed, therefore, that justifiable changes could be made to work practices, and to the planned execution of the work, such that the over-all project cost and schedule baseline could be safely achieved.[8] To achieve this it is recommended that significant teaming efforts among DOE, K-H, and K-H's specialty sub-contractors be initiated to more pro-actively plan what is to be done, in what sequence, and under what sets of controls. Also, recognizing that this involves dealing with cultural issues, it is recommended that technically competent, professional facilitation, of this teaming effort be considered.

Assuming that the above improvements can be made, successful execution is still dependent on DOE's ability to deliver on its responsibilities. To date, development of a truly "Integrated" Closure Project Schedule has not been completed. Currently, the Integrated Schedule reflects only K-H activities. Updating of that schedule to include GFS/I, and a rebaselining of the K-H efforts involved in packaging and shipping SNM and wastes, is underway. It is believed that with proper DOE management of the GFS/I activities, this also should not prohibit the project from being completed on schedule. Although the DOE personnel involved in developing the GFS/I plans have done a remarkable job with a very limited staff, more will be required. Therefore, to assure proper planning and management of these activities it is recommended that the headquarters GFS/I staff (a) be supplemented with project controls (i.e., cost and schedule reporting) professionals, (b) have a more direct reporting relationship to higher levels of DOE Management, and (c) be supplemented with increased on-site representation to facilitate real time statusing and problem solving of GFS/I requirements.

Additional recommendations include the following:

- Improve the definition of DOE roles and responsibilities through development of a project wide Project Execution Plan (PEP), and include within the PEP an EM-1/2 level Executive Sponsor, and Project Executive Committee to include heads of major receiver sites.

[8] Achieving this is complicated by facility requirements still being governed by facility operating license requirements, and improvement of work practices requiring development and approval of separate safety documentation (termed Basis of Interim Operations; BIO's).

- Expand the scope of the Risk Management activities to include all project risks (and not just K-H contract risks), formalize the process, and following the update of the integrated schedule (to include GFS/I) re-evaluate risks.
- Formalize the planning and statusing of the DOE led environmental and regulatory activities.
- Pursue additional activities to promote more pro-active teaming of certain DOE and K-H activities; e.g., develop procedures such as change control and Requests for Equitable Adjustments.
- Formalize the means by which good practices of the Rocky Flats Interim Closure Project will be applied to other closure projects.

Section 3 of this report provides more detail regarding all of the observations and recommendations. Also, Table 3.1-1 of Section 3 provides a summary of all recommendations.

# TABLE OF CONTENTS

## LIST OF FIGURES



## LIST OF TABLES

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## 1. Project Overview

In the aftermath of the Soviet Union's detonation of the hydrogen bomb in 1949, the United States' Government made a firm commitment to expand its nuclear weapons program to compete against this new threat to its national security. In 1951, the Atomic Energy Commission (AEC), the predecessor to the Department of Energy (DOE), selected the Rocky Flats area, near Denver, Colorado, as a site for a nuclear weapons production facility. The AEC chose Dow Chemical Company to operate this new facility and its directive was to machine a plutonium component for use in atomic weapons. In July of that same year, construction began on the site's first permanent building (991) and production of the plutonium components began in April 1952.

From 1952 to 1989, the Rocky Flats facility performed its primary mission of producing nuclear and non-nuclear weapons components for the nation's nuclear arsenal. The key component produced at this site was the plutonium pit, commonly referred to as the "trigger," which provides energy to activate the explosion of a nuclear weapon.

In 1955, the plant's production facilities were expanded; a pattern that was repeated a number of times as the nuclear arms race escalated. With the growth of Denver, a buffer zone of 4,600 acres around the site was authorized in 1972. Rockwell International assumed responsibility for the operation of the site on July 1, 1975.

In December of 1989, the nuclear production work at Rocky Flats was halted to address environmental and safety concerns revealed by the Federal Bureau of Investigation (FBI) and Environmental Protection Agency (EPA). On January 1, 1990, EG&G, Inc., assumed operation of Rocky Flats and worked toward the resumption of operations in the plutonium buildings. With the announcement of the cancellation of the W-88 Trident Warhead Program in 1992, the Rocky Flats' nuclear production mission was permanently halted. The official end of nuclear production at the site was formally announced by the Secretary of Energy in 1993.

Over the course of 47 years, the Rocky Flats production facility left behind a legacy of contaminated buildings, soils, and ground water. The contamination was the direct result of the use of uranium, plutonium, and beryllium to make the "triggers" for the nuclear weapons. As a result of the contamination on site, a massive cleanup effort needed to be implemented. This cleanup effort was given such top priority that the EPA designated the site as a Superfund case. This decision was necessitated, not only because of the contamination, but also due to the following reasons:

- Within a 50-mile radius of the Rocky Flats site, 2.5 million people reside, as part of the Denver metropolitan area, of which 300,000 of them live in the Rocky Flats watershed.
- The large inventory of plutonium.
- Daily operations cost or ~$1million.

In 1995, the DOE developed planning and cost estimates for implementing the Rocky Flats cleanup effort. The estimates covered the more than 700 structures located on the

385-acre Industrial Area of the site that are surrounded by a buffer zone of approximately 5,800 acres of prairie terrain. (See Figure 1-1). The scope and cost estimates included:

- Special Nuclear Materials (SNM) stabilization, packaging, and consolidation
- Deactivation and decommissioning of all facilities
- Environmental restoration of the site
- Property disposition
- Offsite shipment and disposition of wastes.

The cost to perform all of this work was estimated at $37B (non-escalated $'s) and its projected date of completion was 2060.

In 1997, the DOE and Kaiser Hill (K-H), the closure contractor since 1995, completed examination of the early plans resulting in preliminary plans for accelerating the closure to 2010 as described in the 1998 *Paths to Closure* report. However, the DOE and K-H both remained committed that further improvements in the closure schedule could and should be made. In August 1997, then Secretary of Energy Pena challenged Rocky Flats to achieve closure in 2006.

The accelerated plan resulting in closure by December 15, 2006 is the DOE and K-H response to that challenge and is the subject of this review. A summary integrated schedule has not been developed to depict achieving closure consistent with this plan. However, Table 1-1 lists Key Milestones from the K-H baseline that support this closure date. The DOE and KH entered into a new contract effective February 2001, to achieve "Interim Closure" of Rocky Flats by this new end date (December 15, 2006) at a revised cost, excluding fee, of $3.963B (in year of expenditure $'s; See Table 1-2). As defined in the contract, "Interim Closure" is achieved when:

- All buildings are demolished, except continuing water treatment facilities or other structures with a DOE-declared continuing mission.
- All Individual Hazardous Substance Sites (areas of suspected contamination) are remediated or dispositioned per the Rocky Flats Cleanup Agreement (RFCA, amended as of 10/1/99).
- All wastes are removed except for some materials that can be left in place, recycled or used as fill materials in accordance with regulatory requirements.
- Closure caps are used for the remediation of two old landfills, the 700-Area, and the solar ponds or these areas are otherwise remediated in accordance with the RFCA.
- Building foundations, utilities, or other remaining structures, paved roads and/or parking lots are covered by a minimum of three feet of fill after final grade.

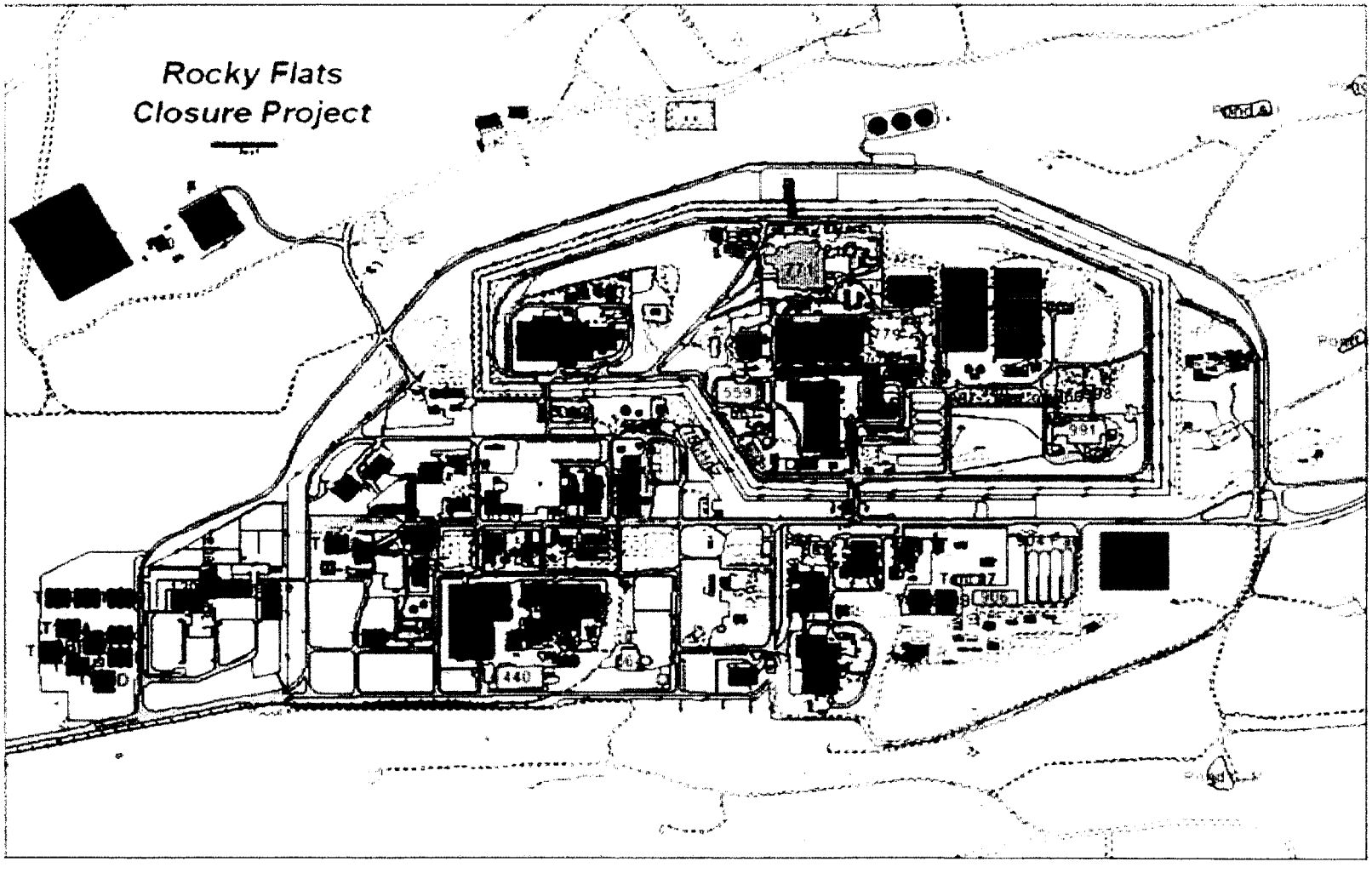


**Figure 1-1 – Aerial View of Rocky Flats Facility**

| Table 1 – 1 Key Closure Project Baseline Milestones | | | |
|---|---|---|---|
| **Activity ID** | **Activity Description** | **Baseline Start** | **Baseline Finish** |
| | **Interim Closure** | | 14Dec06 |
| **371 Complex Project** | | | 11Oct06 |
| 1AFMILE600 | Install & Operate B371 PuSPS-Hot Startup | | 22Nov00 |
| 1AJMILE218 | Complete Repacking SS&C for WIPP | | 27Jul01 |
| 1AQMILE359 | Complete Reprocessing All B771 Liquids | | 31Mar02 |
| 1AWMILE206 | Complete Offsite Shipments of Fluorides | | 02May02 |
| 1AFMILE650 | Pkg Metals & Oxides in 3013 Cans | | 19Aug02 |
| 1AQMILE303 | Comp CAT I/II Holdup Removal Close 371/374 MAA | | 19May03 |
| 1AENDPBD16 | Complete Project B371 Cluster Closure | | 11Oct06 |
| **707 Complex Project** | | | 13Mar06 |
| 1BAMILE305 | B707- Close MAA | | 01Mar01 |
| 1B70799999 | Complete Project B707 Closure Project | | 13Mar06 |
| **771 Complex Project** | | | 13Dec06 |
| 1CFMILE324 | Complete Removal All Liquids in B771 | | 09Oct01 |
| 1CAD74AM66 | B774 Demolition Complete | | 30Mar04 |
| 1CAD71AG68 | B771/774 Stack & Tunnel Demolition Complete | | 27Apr04 |
| 1CAD71AK65 | B790 Demolition Complete | | 01May04 |
| 1CAD71AL69 | B 771/774 Project Demolition Complete | | 18Aug04 |
| **776 Complex Project** | | | 27Oct06 |
| 1DHMILE311 | Close B776/777 MAA | | 10Jul00 |
| 1DFMILE392 | B776/777 Deactivation Complete | | 17Dec01 |
| 1DDMILE414 | Complete B776/777 Slab/Foundation Removal | | 26Apr06 |
| **Industrial Complex/Site Services Project** | | | 12Dec06 |
| 1ECGERM005 | Complete B569 Cluster Closure | | 07Sep04 |
| 1E4MILE605 | All 400 Cluster (except441 & 460) Demolition Complete (several 2005 milestones) | | 25Jul05 |
| 1EFMILE460 | Complete 441 Cluster Demolition | | 19Oct05 |
| 1E88640030 | Several 800 Series Cluster Demolitions Complete in 2005 | | 02Nov05 |
| 1EFMILE527 | Complete 223 Cluster Demolition (N2 Plant) | | 18 Sep06 |

| Table 1 – 1 Key Closure Project Baseline Milestones | | | |
|---|---|---|---|
| **Activity ID** | **Activity Description** | **Baseline Start** | **Baseline Finish** |
| 1ENDISS | Several Milestones in 2006 until Remaining Clusters Demolition Complete | | 11Oct06 |
| **Material Stewardship Project** | | | 14Dec06 |
| 1FCEL29000 | Pu Parts Shipment to LANL Complete | | 05Sep00 |
| 1FCES19000 | Class Pu Parts Shipment to SRS Complete | | 19Dec00 |
| 1FCE459000 | 4.5% Oxide Shipment Complete | | 14Apr01 |
| 1FCEMIL293 | Complete Offsite Shipment of Composites | | 19Jun01 |
| 1FCEM29000 | Unclassified Metal Shipments Complete | | 15Jul02 |
| 1FCEE59000 | eU Parts Shipments Complete | | 16Oct02 |
| 1F9MILE296 | Complete Offsite Shipments-Cat I/II Holdup | | 31Mar03 |
| 1FCEO39000 | Unclassifed Oxide Shipments Complete | | 31Mar03 |
| 1F9MILE301 | Closure of Reduced Protected Area Complete | | 07Aug03 |
| 1FLABCLSD9 | B559- Analytical Lab Ops Complete | | 30Sep03 |
| **Environmental Remediation Project** | | | 14Dec06 |
| 1GEPER1660 | IA Foundation Removals Complete | | 21Apr05 |
| 1GCMILE650 | Buffer Zone Remediation Complete | | 20Oct05 |
| 1GEMILE094 | Complete Site Remediation | | 16Aug06 |
| **EESH&Q Project**<br>**Support Project**<br>**Non-Project Elements** | | | All - 05Dec06 |

- Surface water on site meets health-based standards based on open space use calculated using methodology and toxicity assumptions used for the July 19, 1996 (original contract agreement), surface water action level.
- Water leaving the site in Woman and Walnut Creeks meets the water quality standards established (as of 10/1/99) by the Colorado Water Quality Control Commission.

When interim closure is achieved, long-term assurance monitoring will continue, as part of a separate project (Long Term Stewardship Program), in order to assure that further migration of contaminants will not result in exceeding personnel exposure limits and that the water leaving the site continues to meet water quality standards.

To achieve interim closure, K-H organized as shown in Figure 1-2. The work scope has been subdivided into the nine Project Baseline Descriptions (PBDs) shown at the bottom

of the figure. The baseline cost listed in Table 1-2 is also depicted in terms of these PBDs. The cost table includes the K-H fee and RFFO support cost estimates also.[9]

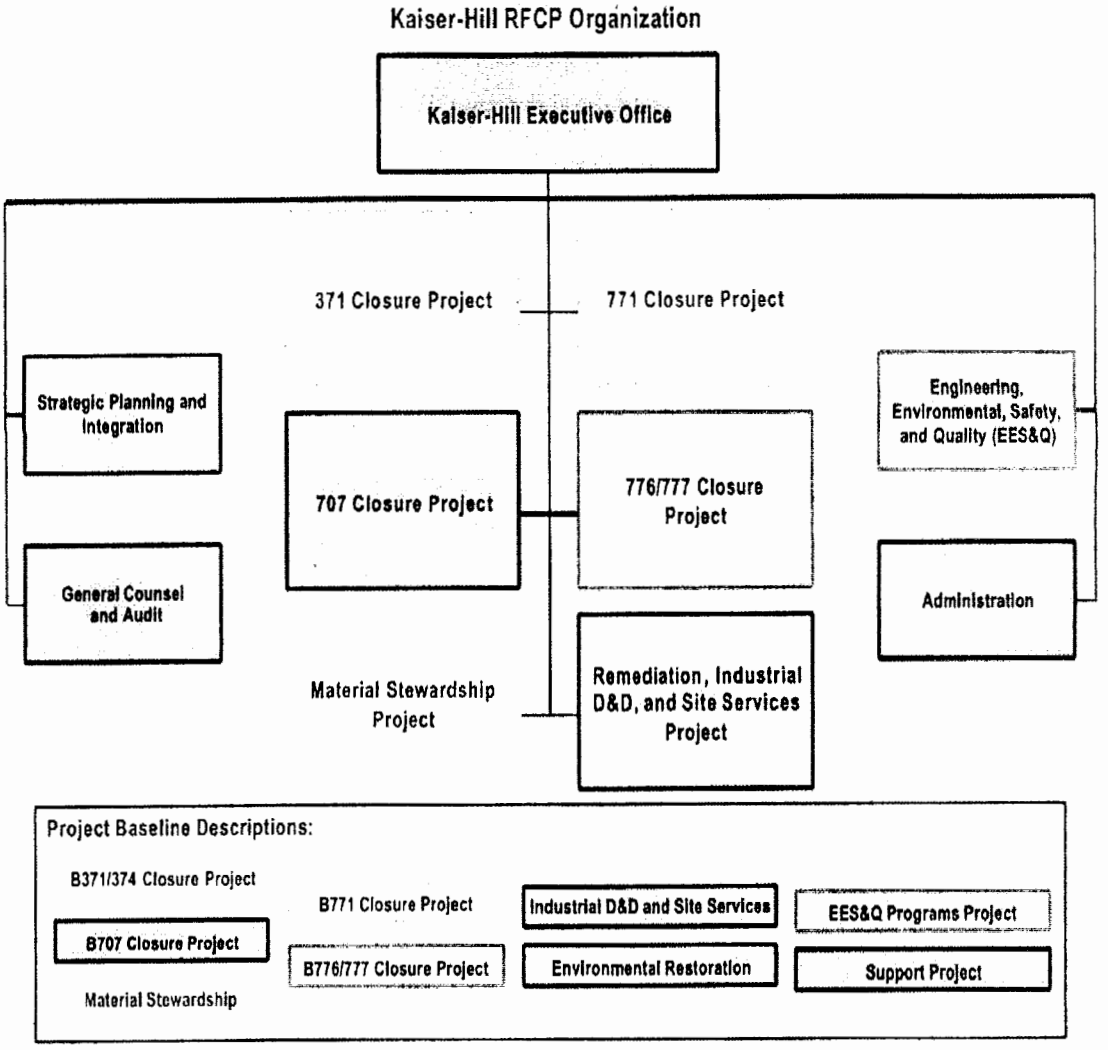


**Figure 1-2 – Organization and Key Work for Rocky Flats Cleanup**

[9] Activities not included in this baseline are as follows: (a) the costs of providing the RFFO staff and its other support subcontractors (≅ $30M/yr), (b) the costs of the EM-33 Staff and its support contractors (≅ $yM/yr) and (c) funding required by repository sites to plan and execute work required by them to enable their receipt of Rocky Flats SNM and wastes (≅ $6M to $7M per yr). Although not reflected, since these activities are critical to the success of the project, the EIR did include review of the scope and planned execution of these activities.

| Project | FY00 | FY01 | FY02 | FY03 | FY04 | FY05 | FY06 | FY07 | Total |
|---|---|---|---|---|---|---|---|---|---|
| B371/ 374 Closure Project | 42,682 | 71,190 | 62,778 | 52,745 | 63,268 | 35,993 | 28,216 | 1,052 | 357,924 |
| B707 Closure Project | 32,859 | 53,601 | 46,939 | 37,672 | 37,233 | 36,127 | 20,694 | 0 | 265,124 |
| B771/774 Closure Project | 37,327 | 68,265 | 59,095 | 47,564 | 27,457 | 1,367 | 1,057 | 0 | 242,131 |
| B776/777 Closure Project | 21,764 | 38,507 | 45,317 | 48,887 | 40,217 | 53,002 | 18,354 | 83 | 266,129 |
| Industrial D&D and Site Services Project | 42,365 | 75,872 | 89,647 | 105,879 | 180,331 | 153,447 | 76,022 | 1,609 | 725,172 |
| Material Stewardship Project | 115,989 | 182,538 | 164,875 | 139,814 | 101,422 | 114,192 | 93,833 | 5,010 | 917,673 |
| Environmantal Remediation Project | 3,501 | 7,181 | 16,598 | 49,106 | 64,229 | 103,738 | 40,574 | 6,295 | 291,221 |
| EES&Q Program Project | 36,539 | 48,857 | 49,007 | 36,216 | 27,167 | 26,113 | 31,366 | 2,350 | 257,616 |
| Support Project | 73,461 | 74,361 | 83,162 | 99,442 | 76,787 | 93,965 | 137,697 | 30,825 | 669,700 |
| | | | | | | | | | |
| Subtotal | 406,485 | 620,373 | 617,417 | 617,324 | 618,111 | 617,944 | 447,812 | 47,225 | 3,992,691 |
| | | | | | | | | | |
| Non-EW05 Funding Included in Above | (6,707) | (6,748) | (3,792) | (3,099) | (3,286) | (2,120) | (2,702) | (1,237) | (29,691) |
| | | | | | | | | | |
| **K-H Closure Project EW-05 Total** | **399,778** | **613,625** | **613,625** | **614,225** | **614,825** | **615,824** | **445,110** | **45,988** | **3,963,000** |
| | | | | | | | | | |
| FEE | 16,404 | 24,575 | 24,575 | 24,575 | 24,575 | 24,575 | 188,432 | 12,288 | 340,000 |
| RFFO Support | 12,533 | 18,800 | 18,800 | 18,200 | 17,600 | 16,600 | 16,300 | 4,100 | 122,933 |
| | | | | | | | | | |
| Total EW-05 Funding | 428,715 | 657,000 | 657,000 | 657,000 | 657,000 | 657,000 | 649,842 | 62,375 | 4,425,932 |

NOTE: for further information see Cost Estimate Report

**Table 1-2 – Rocky Flats Cost Breakdown By Project – from June 30, 2000 Baseline**

The governing regulatory bodies for this project are the Colorado Department of Public Health and Environment (CDPHE) and the US Environmental Protection Agency (EPA). The current cleanup requirements are specified for various radioactive and hazardous wastes by the Rocky Flats Cleanup Agreement (RFCA), a legally binding agreement among the EPA, the CDPHE, and the DOE. RFCA provides "interim" cleanup action levels, which also serve as interim cleanup requirements. Establishment of proposed final requirements is scheduled to occur by the end of this CY. Also, the Defense Nuclear Facilities Safety Board performs safety oversight of nuclear activities.

The Closure contract is a unique, first-of-kind agreement between the DOE and a contractor. The KH incentive fee plan is one aspect that makes the new contract unique. The contract provides for quarterly fee payments based upon "earned value" achieved for pre-determined work activities and for cost performance. If the target cost and schedule are achieved, the cost and schedule incentive fees equal $340M and $15M, respectively. Figures 1-3 and 1-4 are taken from the contract and show how greater or lesser incentive fees could be awarded as a function of actual cost and schedule performance versus these targets. To capitalize on this, K-H is presently working to a schedule plan that has a December 15, 2005 completion date. None of the available incentives, though, are actually earned until the project is completed. It should also be noted that there are fee deduction provisions for safety violations. An important advantage of this incentive system is the increased flexibility afforded K-H. K-H will have the flexibility to determine which work to perform based upon work situations, project needs, and what makes sense for the overall path toward closure. This flexibility is unprecedented in DOE practice.

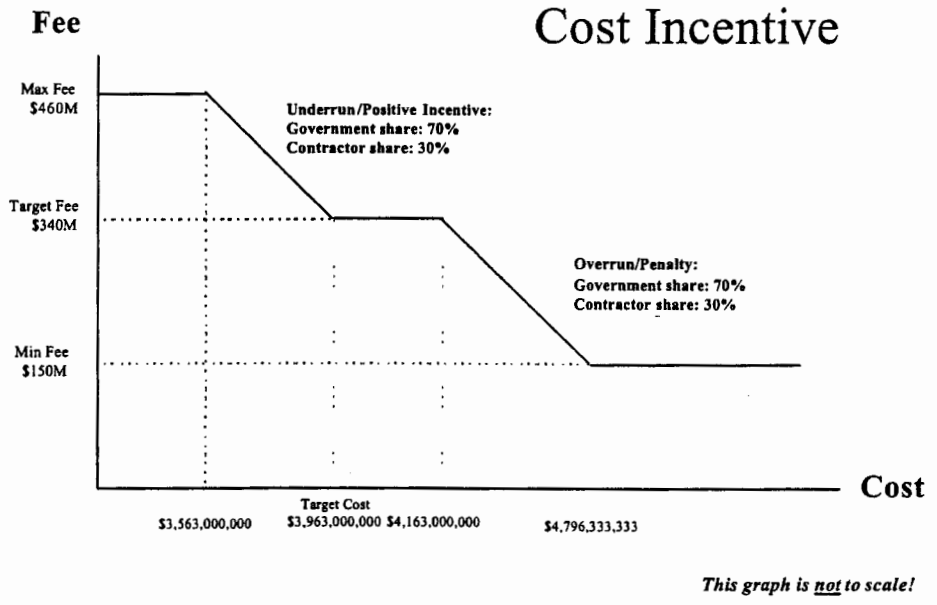


**Figure 1-3, Contract Cost Incentive Fee**

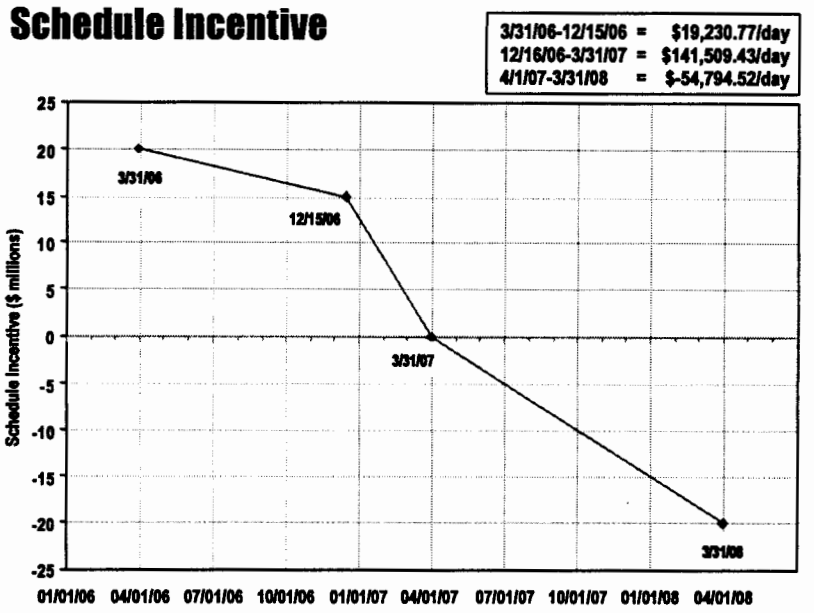


**Figure 1-4, Contract Schedule Incentive Fee**

Another unique aspect of the project is DOE's dual role and responsibility. In addition to the traditional role of being the customer and over-seeing the contract, the DOE also has significant activities that it must execute in order for the project to be successful. These activities consist primarily of (1) supporting SNM and waste shipments to receiver sites, (2) pursuing required regulatory activities and (3) performing safety over-sight through establishment of safety requirements and over-seeing work packages and work execution to assure compliance with these requirements.

1. Supporting SNM and Waste Shipments to Receiver Sites: The DOE Headquarters EM-33 group is responsible for coordinating DOE's support of shipping SNM and wastes from RFETS to receiver sites. It is a complex task that involves obtaining support from other DOE sites in the following areas:

- Certifying shipping containers for carrying materials whose characteristics are not necessarily bounded by existing certifications.
- Obtaining changes to RCRA Part B permits to receive wastes whose characteristics are not necessarily bounded by the existing permits.
- Obtaining the various types and quantities of shipping containers from the DOE complex to meet shipping requirement dates specified by K-H.
- For SNM and TRU waste shipments, preparation of receiver sites and transportation services.

April 2001 projections estimate that the project has to transport 15,000 cubic meters of transuranic and transuranic mixed waste, 45,000 cubic meters of low-level mixed waste,

and 181,000 cubic meters of low-level waste to designated receiving sites (See Figure 1-5).

EM-33's not being able to provide the GFS/I items when required could, therefore, greatly impact K-H's ability to perform on cost and within schedule. For this reason, Burns and Roe believes that EM-33 and K-H must work together to properly coordinate GFS/I needs. Otherwise, shipping containers will not be delivered when required (and could become the basis of "requests for equitable adjustments" by K-H), or equipment needed in other places within the DOE complex could be sitting idle.

2. Pursuing Regulatory Required Activities: This work entails working with the EPA and CDPHE, and major aspects of this work include the following:

- Determining Proposed Final Clean-up Requirements[10]: There is still uncertainty as to "how clean is clean" and, therefore what levels of cleanup must be achieved. For example, with respect to Plutonium, RFCA has set an interim soil action level of 651 picocuries of plutonium per gram of soil. Other levels have been considered and researched, but none of them have been accepted. Final proposed levels must provide assurance that both (a) projected annual exposures of personnel, or the risks resulting from those exposures, will not exceed the levels specified for the final site end use, and (b) soil contamination entering the surface water through erosion will not result in water leaving the site that exceeds drinking water standards. Determination of final proposed limits is scheduled to occur by the end of this CY.

- Obtaining Required Regulatory Approval of Environmental Restoration Documents: As part of the environmental restoration close out process, there are numerous documents that serve to define either planned or completed actions to the regulators, and to obtain their approval. For planned actions, their approval is a pre-requisite to the start of work, and for completed actions their approval is necessary to achieve interim closure. These documents include: Sampling Plans, Decision Documents, and Requests for No Further Actions.

[10] Within this context, "Proposed Final Clean-up Requirements" are the requirements that are to be used as a basis for achieving "Interim Closure". Further, the expectation would be that the "Proposed Final" requirements would eventually become the "Final" requirements. This, only after longer term monitoring as part of the follow-on project "Long Term Stewardship" assures that the contaminant migration does not result in exceeding either personnel exposure limits or that ground water leaving the site does not exceed drinking water standards.

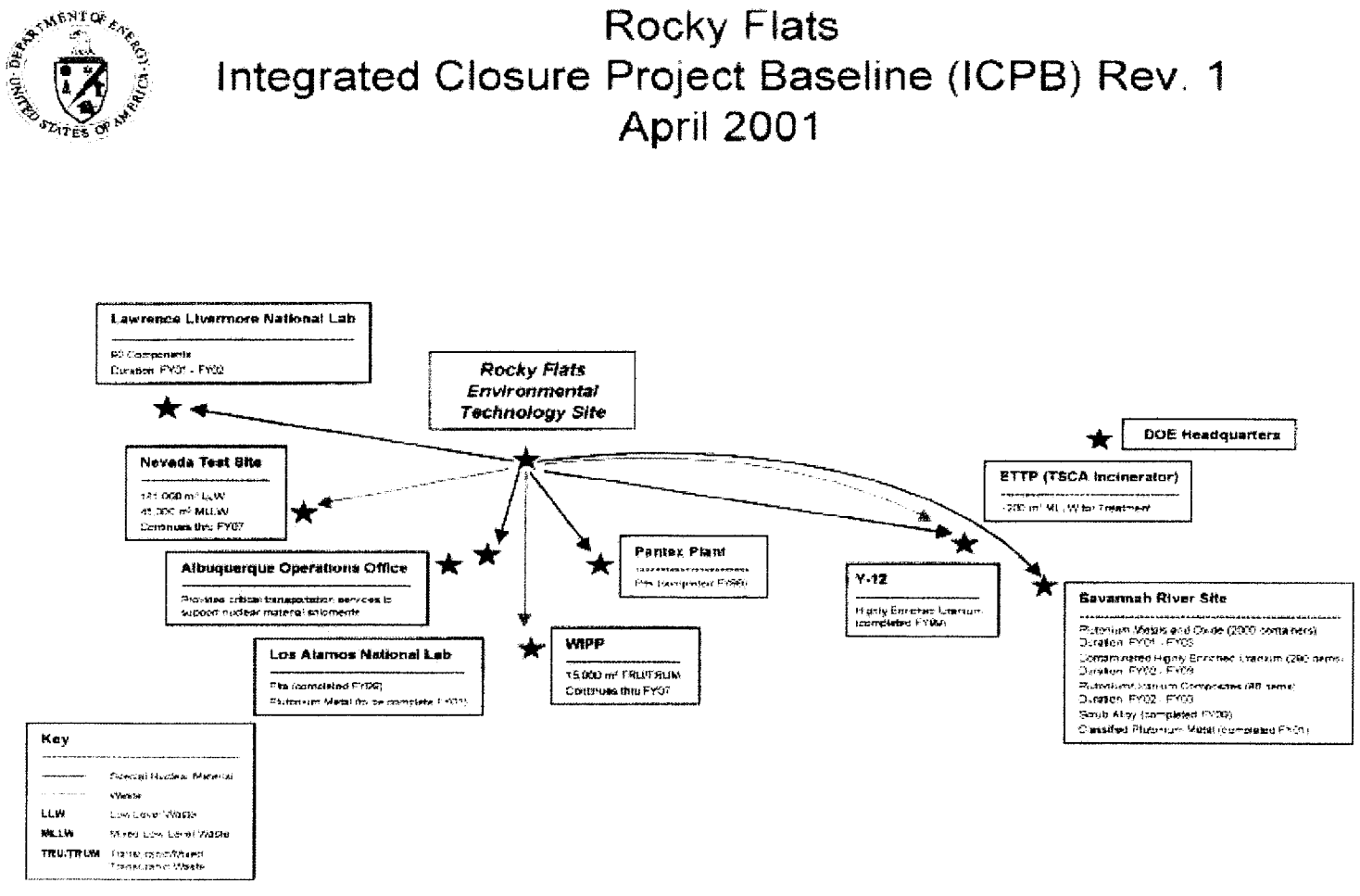


**Figure 1-5 – Sites Interacting with Rocky Flats**

3. Performing Safety Over-Sight: DOE maintains ownership of the documents that establish safety requirements. DOE also has oversight responsibility to ensure compliance with respect to K-H work packages and actual work execution. The documents that specify safety requirements include facility specific "Authorization Basis" and "Basis of Interim Operations" documents, and site wide practices and requirements documents. Because many of the Authorization Basis documents are based on operating facility requirements, it appears that much can be done to simplify these requirements in order to make them more applicable to a site closure environment, and DOE participation in these efforts is crucial to their success.

There are two final aspects of the planned approach to the work that are worthy of note. The first deals with the assumed funding being provided for the various activities. To this end, (a) K-H and RFFO support funding is assumed to be provided per Table 1-2 (total near term funding equals $657M per yr), plus (b) funding of repository sites is assumed to be provided at $7M per year. The second aspect of the planned approach worthy of note deals with sub-contracting. For this area, K-H has committed to a *goal of* subcontracting 80% of the work, while self-performing the remaining 20%.

# 2. External Independent Review Scope and Methodology

## 2.1 External Independent Review (EIR) Scope

The Department of Energy Rocky Flats Field Office (RFFO) requested that the Department of Energy Office of Engineering and Construction (OECM) obtain an independent confidence review of the updated 2006 Rocky Flats Integrated Closure Project Baseline (ICPB). *"The review is to determine the completeness of scope to accomplish the closure of the project, the reasonableness of costs and the accuracy of the completion schedule."*[11]

The current closure contract between DOE and the Kaiser-Hill Company, L.L.C. (K-H) became effective in February 2000. It required that K-H submit a revised Closure Project Baseline (CPB) by June 30, 2000. The CPB was further defined in the Rocky Flats (RF) Closure Project (RFCP), Project Management Plan, Revision 5, dated June 30, 2000 as consisting of the following:

- Scope: Project Baseline Descriptions (PBDs), a detailed description of the scope of work.
- Schedule: CPB Schedule, a logic-based schedule of all work activities.
- Cost: CPB Cost Estimate Report, Rev 0, June 30, 2000, a cost for all project activities (includes basis of estimates for the cost).
- Management and Controls: RFCP Project Management Plan, Rev 5, June 30, 2000 and all documents referenced by it.

In addition to the CPB defined above for K-H, the ICPB includes DOE activities to provide the contractually defined Government Furnished Services and Items (GFS/I) items and the activities of the DOE RFFO staff in support of closure project implementation.

This review was performed of the baseline as described by the above documents, GFS/I documents provided by the Rocky Flats Program Office, EM-33 staff at Headquarters, and additional material provided by the DOE RFFO staff and K-H staff. A complete listing of documents reviewed is provided as Appendix D.

## 2.2 EIR Methodology

### 2.2.1 Review Team and Assignments

The review was accomplished by a Burns and Roe team of personnel who collectively provide technical, cost estimating, scheduling and management expertise covering the following subject areas:

[11]This description of the EIR scope is derived directly from the Task Plan that authorized Burns and Roe to perform this review. Also, ICPB encompasses not only the scope of work required by the closure contractor, but also that required by DOE.

- Nuclear waste handling technical and regulatory issues
- Nuclear facility design, construction, operation, and decommissioning
- HLW transportation, packaging, and storage
- Environmental, safety and health experience in hazardous, radiological and toxic waste management including remedial investigations, feasibility studies, and remediation of controlled and uncontrolled waste sites.
- Special Nuclear Material (SNM) Safeguards and Security (S&S)
- Risk management and analysis
- Facility deactivation and hazard stabilization
- Decontamination and Decommissioning
- DOE Project Management Practices

The project work scope was categorized into eleven (11) different areas consisting of (a) the nine different projects into which K-H has organized its efforts, (b) the DOE led GFS/I effort, and (c) over-all Project Management.

Review of the nine project areas consisted of a three-part review process as discussed below.

- Identification of work activities and reasonableness of approach: The identified activities were reviewed and the reasonableness of the planned approach for executing the work was assessed. The management control processes related to the development, approval and execution of work packages were also reviewed. Personnel who possess appropriate technical knowledge of the area being reviewed led these reviews.
- Cost Estimating Systems and Methods: The estimated costs were reviewed to determine whether they are based on reliable cost estimating systems and methods, whether they are appropriate for a program of this complexity and stage of development, and whether they reflected the attendant uncertainties and risks. Cost estimators led these reviews.
- Integrated Schedule Logic, and Activity Durations: The work activities that make up the scope for that area were assessed to determine whether they are executable within the over-all schedule logic and assumed activity durations. Personnel possessing technical skills for each of the areas were involved in these reviews, and the over-all lead for review of this area was assigned to a project controls and scheduling expert.

A two-man team experienced with management of large DOE projects, and DOE Program and Project Management practices reviewed project Management of the over-all Interim Closure Project.

The GFS/I area was reviewed by a team consisting of the two-man team mentioned above, plus the project controls and scheduling expert.

Table 2-1 lists each of the areas that were reviewed, the section number of this report where the results of the review are documented, and the personnel leads for each of the areas reviewed. Appendix A provides biographical experience summaries for the review-team leader (Don Grace), the Burns and Roe Cost Estimating Manager (Walter Krzastek, who provided oversight of the cost estimators efforts), all of the personnel listed in Table 2-1, and other primary contributors to the review effort.

### 2.2.2 Review Approach and Schedule

The review approach and the schedule for the activities is discussed below:

Task Plan Approval: A meeting was held at Rocky Flats to review and approve the task plan. At that time, additional project documentation was requested. Burns and Roe then reviewed project documentation at its home office and suggested an agenda for a kick-off meeting that was held at Rocky Flats starting April 2, 2001.

Review Team Kick-off Meeting/Site Visit: The review team kick-off meeting was conducted at Rocky Flats April 2-6, 2001. A general briefing was provided to the Burns and Roe team regarding the project and a tour of the Site provided. Included in the briefing were a description of the interim closure end-point conditions, the approach to satisfying the regulatory requirements, the development of the cost estimates, the schedule, the DOE-K-H contract, and the management plans, processes, and procedures. More detailed breakout briefings and supporting cost estimate information, of the categories of work activities were also conducted.

Review at RFPO DOE (EM 33) Headquarters: Three review team members met for two days with the DOE EM personnel responsible for planning and executing actions required for DOE to meet its GFS/I responsibilities. The meeting was conducted at Germantown, Md. on April 19-20, 2001.

Review at Home Office: Over a period of about four weeks, Burns and Roe performed further review of the information provided.

Follow-up Review Visit: Burns and Roe provided a listing of additional topics to be reviewed at a follow-up meeting at the project field office at Rocky Flats. The follow-up visit consisted of a smaller portion of the review team from May 7-10, 2001. At the conclusion of the follow-up visit, on May 11$^{th}$ an out-brief was provided by Burns and Roe of the results of its review up to that point.

Further Review at Home Office: Burns and Roe started compiling the draft report, and in parallel worked to resolve remaining open items with the Rocky Flats Field Office Staff.

Draft Report: The completed draft report was prepared and provided for DOE review June 6, 2001 (portions were provided earlier). Review comments were provided to Burns and Roe over the following two weeks.

| Table 2-1; Rocky Flats Closure Project, EIR Review Team Leads | | | | | |
|---|---|---|---|---|---|
| **PBD** | **Title** | **Report Section** | **Activities & Approach** | **Cost Estimating Process/ Procedures** | **Schedule Logic & Activity Durations** |
| A | B371/374 Closure Project (Bldgs and Facil) | 3.2 | Norm Lacy | Mark Randazzo | John Stevens |
| B | B707 Closure Project (Facilities Cluster) | 3.3 | Norm Lacy | Mark Randazzo | |
| C | B771 Closure Project (Bldgs and Facilities) | 3.4 | Norm Lacy | Mark Randazzo | |
| D | B776/777 Closure Project (Bldgs and Facil) | 3.5 | Larry Rutland | Scott Foster | |
| E | Industrial, and Site Services Project (Many Buildings and Facilities) | 3.6 | Chander Bijlani | Vern Peterson | |
| F | Material Stewardship Project (Technical program direction and disposition of SNM and waste generated by the other projects) | 3.7 | John Tuohy | Debbie Danielson | |
| G | Environmental Restoration Project (All areas) | 3.8 | Chander Bijlani / Steve Gertz | Vern Peterson | |
| H | Engineering, Environmental, Safety, Health & Quality Programs Project (Support) | 3.9 | Larry Rutland | Scott Foster | |
| J | Support Project | 3.10 | Don Fultonberg / John Stevens | Debbie Danielson | |
| | GFS/I | 3.1 | Don Grace / Don Fultonberg / John Stevens | | |
| | Project Management | 3.1 | Don Grace / Don Fultonberg / John Stevens | | |
| | | | | | |
| | Overall Project Control | App B | John Stevens | | |
| | Overall Cost Estimates | App C | Scott Foster | | |

Briefing at DOE Headquarters: A briefing of the Burns and Roe observations and recommendations will be provided at DOE Headquarters if directed by DOE.

Final Report: Review comments were addressed and this final report issued.

### 2.2.3 Key Program Personnel

Key program personnel with whom Burns and Roe interfaced during the review process are listed in Table 2-2.

**Table 2-2 Project Personnel With Whom Burns and Roe Interfaced**

| Subject Area | DOE Individual (RFFO, unless indicated otherwise) | K-H Individual |
|---|---|---|
| Overall Program | Barbara Mazurowski | Alan Parker |
| | Frazer Lockhart | Pete Swenson |
| | Tom Lukow | Erin Bognar |
| | Art Haugh | |
| | Greg Moore | |
| | John Schneider | |
| | Ravi Batra | |
| | Joe Nolter (PA&E consultant) | |
| Building 371/374 CP | Ed Pietsh | Gerry Tasset |
| | Fred Gerdeman | David Wallick |
| | | Mike Carpenter |
| Building 707 CP | Greg Nishimoto | Chris Schoenbauer |
| Building 771 CP | Joe Springer | Jeff Stevens |
| | | Joel Zarret |
| | | Linda Rudd |
| | | Brian Larsen |
| Building 776/777 CP | Sandi McLeod | Jeff Kerridge |
| | Gary Schuetz | Paul White |
| | | Dave Michael |
| Industr, SS. | Keith Heavlin | Frank Gibbs |
| | Steve Tower | Sam Gianti |
| | | Al Rubalcaba |
| Material Stewardship | Reg Tyler | Marvin Brailsford |
| | Larry Wilson | Linda Pace |
| | | Beth Telesmanich |
| | | Tim Hedahl |

**Table 2-2 Project Personnel With Whom Burns and Roe Interfaced**

| Subject Area | DOE Individual (RFFO, unless indicated otherwise) | K-H Individual |
|---|---|---|
| Environ. Restoration | Norma Casteneda | Lane Butler |
| | | Doug Shafer |
| | | Sam Gianti |
| Eng, Environ, Safety, Health, & QA | James Jeffries | Mark Spears |
| | | Ken Powers |
| | | Louis LaMoine |
| | | Marea Haugh |
| | | Stacey Pike |
| RFFO Support | Lance Schlag | |
| Support Project | Bob Vineski | Dennis Betcher |
| Project Controls | John Schneider? | Bill Harroun |
| | | Jim Denham |
| GFS/I | Todd Anderson | |
| | Frank Sheppard- EM 33 | |
| | Christine Gelles-EM 33 | |
| | Marc Jones-EM 33 | |
| | Eric Huang-EM 33 | |
| Overall Schedule | | Michael Michel |
| Overall Cost Estimates | | |
| | | |
| | | |

# 3. OBSERVATIONS AND RECOMMENDATIONS

This section of the report addresses the observations and associated recommendations developed from the Burns and Roe review described in Section 2.

The general observations and recommendations, covering subjects common to many or all Closure Project elements, are contained in Section 3.1.

Section 3.2 provides a discussion of the nine separate project areas into which the Closure Project workscope had been subdivided. Sub-sections 3.2.1 through 3.2.9 provide detailed observations and recommendations for each of these nine project areas. All of the more detailed recommendations are relatable to the general recommendations provided in Section 3.1, and Table 3.1-1 provides a consolidated listing of the general recommendations and the associated more detailed recommendations.

## *3.1 General Observations and Recommendations*

This section covers the following:

- Completeness of scope to accomplish the closure of the project (Section 3.1.1)
- Reasonableness of costs (Section 3.1.2)
- Accuracy of the completion schedule (Section 3.1.3)
- Adequacy of management controls (Section 3.1.4)

For each of these four sub-sections, summary conclusions are also provided.

### 3.1.1 Completeness of Scope to Accomplish Closure of the Project

There are scope risks that are not within the K-H contract scope of work. Since the current Risk Management process is maintained primarily by K-H, and is focused on the cost and schedule risks only as they relate to the contract defined scope of work, it therefore, does not envelope risks not within the K-H scope. These items, not formally identified or tracked as part of the risk management process, and their estimated potential cost impacts[12], include the following[13]:

- Final clean-up requirements necessitating more environmental remediation (ER) work than is defined by the K-H contract; $40M for the most likely scenario.
- Inability to recycle steel; $20M - $100M.

[12] Potential cost impacts are based on interviews and inputs from either DOE or K-H representatives.

[13] Depending on how one categorizes issues, another item that could be categorized as scope increase is the in-process REA to capture the additional work required as a result of changes to the WIPP Waste Acceptance Criteria (WIPP WAC). BR was advised that this issue is complicated by some of the added work allegedly being within the newly established baseline (in anticipation of the WIPP WAC changes). Further, this issue is captured, and it is in Section 3.1.2.1 (the sub-section titled *Delays/ Problems Experienced to Date*).

- Unstable slopes around original landfill requiring modifications to it; $100M - $175M.

Another potential scope risk item is "litigation support". As noted earlier, the baseline budget for this, included within the RFFO Support category, is roughly $5M/yr. Burns and Roe was advised that this line item includes the cost of litigation as well as the settlement costs resulting from all (i.e., since day 1) litigation actions that are still in progress. The cost risk associated with item, although potentially very large, was not quantified.

> General Recommendation GR-S1[14]: Expand the Risk Management process to include all scope risks associated with successful implementation of the Closure Project, and not just those within the K-H contract scope of work. For these items, implement a process that (a) identifies the scope risk items, (b) provides a documented basis of their potential impacts, and (c) ensures sufficient actions are being taken to either mitigate them, or (if necessary) integrate them into the baseline plans.

For the K-H contract scope of work, there is extensive documentation of the required work activities. The individual project management plans define the scope for that element that is then expanded into detailed Integrated Closure Work Plans (ICWPs). Although, in Burns and Roe's judgment, there may be some approaches or work practices that could be reconsidered (discussed in the appropriate section of the report), the work is clearly defined within K-H's contract Statement Of Work (SOW), they are aware of the risks, and pursuing other approaches would not significantly impact costs.

For the DOE project execution activities, significant efforts have been made to identify the GFSI activities. However, further, and more detailed, work is warranted in this area and is covered under "Management Controls". With respect to other major DOE activities in its project execution area, there is a lack of formal identification of required work activities, and their status. The major deficiency relates to Environmental and Regulatory activities. The DOE lead staff for these areas exhibited a clear understanding of what needs to be done to achieve the objectives. However, this is not formally documented with assigned responsibilities, action plans, schedules, and status reports that would permit management visibility and action as needed to ensure successful implementation.

> General Recommendation No. 2 GR-S2: DOE RFFO provide documented identification, planning and status of major environmental activities; i.e., (a) activities required to finalize clean-up requirements, (b) activities required to achieve regulator approval of planned and completed clean-up activities, such as Sampling Plans, Decision Documents, and final approval of Close-Out Reports for No Further Actions, and (c) any other regulatory issues or actions.

[14] General Recommendations are sequentially numbered for each of the four areas; i.e., GR-S1 is first recommendation dealing with "Scope", GR-C1 is first recommendation dealing with "Cost", etc.

Summary Conclusion: Apart from the areas addressed by GR-S1 and GR-S2 above, the defined scope for the participant organizations appears sufficiently complete to accomplish the Rocky Flats Interim Closure Project as currently defined.

### 3.1.2 Reasonableness of Costs

Summary observations that could either degrade, or improve, the ability to execute the closure project within the target/ baseline cost are provided within this section, as are related general recommendations (GR-C1 through GR-C3). A description of the project cost estimate is provided in Appendix B, *Project Cost Estimating*.

Prior to reviewing the reasonableness of the cost estimate, it is worthy to note that a major mechanism for controlling project cost and schedules is the contract with K-H. This contract is of the "cost plus incentive fee" type. Costs in excess of the target (baseline) cost reduce the amount of fee that K-H is awarded based on a formula contained within the contract; Figure 3.1-1 depicts this. The same principle applies for schedule performance, and Figure 3.1-2 depicts this.

Even with the above incentives, however, costs in excess of the target are still charged to DOE. This scenario simply results in less incentive fee being earned by K-H. Therefore, effective contract over-sight is still very important to assure project cost control.

#### 3.1.2.1 Potential Cost Increases

There are several observed categories of risks that could increase the final cost, as follows:

- Scope Additions: These were addressed in Section 3.1.1 and could total on the order of $300M.
- Delays/ Problems Experienced to Date: There are two major problem areas in this category:

  a) Changes made to the Waste Isolation Pilot Plant Waste Acceptance Criteria (*WIPP WAC*) - During Burns and Roe's first site visit, a Request for Equitable Adjustment (REA) had been submitted by K-H, and then withdrawn pending further review and development. The major subject of the REA was changes to the contract target cost and schedule resulting from changes made to the WIPP WAC. During its second site visit, the forecast outcome of this issue was not clear, with inputs varying from "it is going away" to "the minimal cost impact is on the order of $40M to $50M." Clearly, until this REA is submitted and negotiated, the changes cannot be determined.

  b) Delays in getting the Plutonium Stabilization and Packaging System (*PuSPS*) to the required processing rates – Information provided to Burns and Roe indicates that the PuSPS production problems are on a critical path and are impacting Protected Area closure, but not yet delaying the 2006 baseline closure date. Although some

degree of work-arounds are available, PuSPS by itself is delayed by several years. As of when the Burns and Roe team left the site on May 11th, it was still not operable.

In light of the problems experienced to date, plus the future uncertainty regarding attainable PuSPS production rates, the possibility of cost increases in this area is not insignificant.

Recognizing that this is a critical activity and has been delayed significantly, it was also observed that there are no back up or contingency plans in the event PuSPS fails to meet the established requirements.

- Schedule Stretch-out: Schedule stretch-out can have a significant impact on the cost. This is due not only to extended project management and overhead functions, but also due to the high landlord costs associated with any delays in completing the decontamination and decommissioning (D&D) of the existing facilities.[15] Therefore, the PuSPS and WIPP WAC issues discussed above not only have a potential for direct cost impacts, but also if they were to stretch out the schedule this could result in additional costs.

  Another significant risk to stretching out the schedule and thereby increasing costs are potential mismatches between the K-H GFS/I required dates and quantities, and DOE's ability to deliver to meet those needs. Recommendations to help minimize this potential problem are presented in the section titled "Management Controls".

- Assumed Use of D&D Methods that May Not be Feasible: There is the potential for a D&D project to assume the use of normal demolition activities, thereby under estimating the demolition costs. This is raised because it was expressed that removal of ventilation exhaust stacks attached to former Pu fabrication facilities were expected to be brought down by exploding, versus piecemeal removal which is a more expensive process and would be expected to be used for formerly or possibly contaminated structures). From a cost and schedule standpoint, this is not a conservative basis since there is a very real possibility that all of the prerequisites for using explosives, e.g., decontamination of the structure, will not be achievable.

- Planned Use of Overtime and Impacts on Productivity: The planned use of overtime is significant (20% for processing, deactivation, decontamination and decommissioning activities) and the assumed productivity rates are assumed to be the same as with straight time. Experience at other sites would indicate that this is not a realistic assumption.

  General Recommendation GR-C1: Either (a) re-examine and lower planned overtime, or (b) consider how to incentivize subcontractors to improve productivity.

[15] More detailed discussion of these costs is provided in the observations preceding General Recommendation GR-C2.

### 3.1.2.2 Potential Cost Reductions

Although the above issues could contribute to cost increases, there are several observations that indicate a potential for substantial cost reductions. All of these observations relate to general work requirements and practices versus commercial practices, and they include the following:

- Of the roughly $4B K-H baseline/target cost, roughly $1.2B is associated with hands on closure work. The remaining $2.8B is landlord type costs that exist largely due to facility requirements that were developed for operating facilities (versus facilities in the process of being D&D'd)[16].
- Of the total craft labor hrs, 17% are electricians and laborers are lower than expected. For a closure project one would expect laborers to be much higher and electricians to be much lower.[17]
- The total manning in certain other areas (e.g., Rad Techs) is very high.[18]

General Recommendation GR-C2: Undertake a concerted effort to simplify work practices and thereby significantly reduce landlord costs. To this end, consider a teaming effort between RFFO and K-H, setting goals, modifying work requirements and implementing practices, and measuring the results in terms of decreased cost and schedule estimates. If done properly, this should provide for increased safety. To help implement this process, consider using an outside, professional facilitator.

The issue of work requirements and practices is not necessarily straightforward. It was previously noted that many requirements are the result of the facilities still being governed by requirements applicable to licensed operating facilities. Within a building, simplification and streamlining of these requirements requires proactive facility D&D planning that includes:

a) Defining interim configurations through which a facility is to be deactivated and decommissioned,

b) Defining the safety requirements applicable in moving from one configuration to the next, and

c) Processing and approving the necessary safety review documentation (termed *Basis of Interim Operations* (BIO)).

Evidence of pro-active planning exists for the site over-all. For example, the approach consists of consolidating Special Nuclear Material (SNM) into Building 371, thereby

[16] Appendix B, Table B-1, provides a financial model to show that if one were retiring a $1.2B mortgage (i.e., real work) over the period of the current contract, with yearly and monthly payments consistent with the funding of Table 3.1-1, then the landlord (i.e., carrying, or interest charges) of $2.8B is equivalent to an interest rate of over 50%. The message from this is to lower the interest rate (i.e., simplify work practices), and to make principal payments on time (i.e., do not get behind on real work).

[17] This is due in large part to an existing site requirement that whoever installs equipment must remove it, versus commercial "cold and dark" practices of de-energizing a building and having laborers dismantle it.

[18] This is due in large part to the existing requirements being based on operating facility requirements.

allowing for a shrinking of the Protected Area. This not only reduces the security guard requirements, but also of even greater impact is the simplification of personnel getting into and out of many of the work areas.

However, Burns and Roe did not observe this type of pro-active planning at the Facility D&D level. Rather, in general it appears that individual Facility D&D Plans (termed Decommissioning Operations Plans; DOPs and Project Management Plans; PMPs) tend to be at a relatively high level considering some of the more detailed technical issues associated with pro-active D&D planning. Although the work does eventually get defined and executed through the generation of the Integrated Work Control Procedures (IWCPs), for the most part that process (a) takes as a given, the existing operating facility requirements, and (b) is a bottoms-up planning process that does not result in planning and executing the over-all work in an optimal manner.

General Recommendation GR-C3: Pro-actively develop Facility D&D plans (either by revising DOPs and PMPs, or generating a new document) that are focused on providing a more optimized approach to achieving D&D, and the associated safety requirements. This new document should integrate the various projects on a strategic or site-wide basis. In developing these plans, consider forming teams consisting of appropriate representation from the K-H and DOE project(s) and safety organizations. As part of this process, also consider incorporation of lessons learned from similar facility D&D.

Another area that deals with work planning at a higher/site wide level is determining the optimum sequence for execution of the projects. With the highly projectized over-all approach, many of the projects are for the most part being pursued in parallel. More detailed observations regarding this approach are contained in some of the individual project review areas. A summary of these comments, and a general recommendation, are provided as follows:

- Landlord and other support costs appear to stay at a relatively high level late into the project. If the limited annual project funding were utilized to accelerate complete closure of some of the buildings (versus pursuing so many projects in parallel), this could possibly lead to accelerated decreases of landlord and other support costs. This, in turn, would free up funds for pursuit of other closure work.
- During the last two years of the project the required shipments of wastes increases dramatically. Except possibly for TRU wastes, the planned approach is to truck all of these wastes. With the volumes to be shipped, it may not be possible to safely execute this work on schedule. Possible alternatives are to consider (a) doing more project work in series (versus in parallel), and/ or (b) considering upgrade and use of the existing on-site rail system to move these wastes by rail. In addition to offering potential safety advantages, the use of rail could also offer potential costs savings.

General Recommendation GR-C4: Consider pursuit, and documentation of, site-wide strategic planning to ensure that site wide closure project planning issues are being addressed in an optimum manner.

General Recommendations GR-C2, C3, and C4 all deal with have more pro-active project planning, they deal with different levels of planning, and they all have some degree of over-lap. The exact means for addressing these recommendations in an optimum way was not considered in this review, but it is suggested that it may be appropriate to form a strategic planning group (with representation from RFFO and K-H), to determine the best approach.

#### 3.1.2.3 Summary Conclusion Regarding Reasonableness of Costs

If significant improvements are not made to work requirements/practices, work planning, and safety oversight, then in light of the problems experienced to date plus potential new problems (e.g., perhaps GFSI not being provided on time), the probability of schedule stretch-out and therefore, cost over-runs, is very high. It is believed, however, that effective implementation of recommendations GR-C2, GR-C3 and GR-C4 would control costs such that the project could be completed within its target/baseline cost with acceptable safety performance.

### 3.1.3 Accuracy of Completion Schedule

This section provides summary observations and recommendations (designated general recommendations GR-SC1 through GR-SC3) regarding the over-all quality/ completeness of the schedule. Summary conclusions regarding the ability to complete the interim closure project by the current target completion date of December 15, 2006 are also included in this section. A discussion of the overall project control system including scheduling process and practices is provided in Appendix B, *Project Control System*.

#### 3.1.3.1 Completeness of Schedule

K-H maintains a project schedule for their contract scope of work. However, although this covers the site activities related to closure, it does not include the critical DOE activities leading to supply of the GSF/I products. Therefore, an integrated project schedule depicting and providing status of all activities needed to successfully attain interim closure, does not exist. Both K-H and DOE staff indicated that they are working toward creating an integrated schedule, but until this effort is completed, it cannot be conclusively stated that the schedule of closure activities is complete.

Per the contract, on an annual basis K-H provides a listing of their GFS/I requirements to DOE, and on a quarterly basis K-H provides DOE an update of this listing. Also per the contract, DOE is required to satisfy the GFS/I requests for those items that are required to support K-H's performance baseline schedule with completion by December 15, 2006. For requests that are accelerated relative to this baseline, DOE has committed to addressing these requests on a best effort basis. There are currently substantive mismatches between some dates K-H requested for GFS/I items and DOE's ability to provide them. For example, the FY01 2$^{nd}$ Quarter GFS/I Projection prepared by K-H March 29, 2001 indicated variances as late as 216 days from the need. However, this

represented K-H total need for an item without consideration of sequencing activities based on planned progress, or by work-arounds. Also, it is unclear as to whether the K-H need dates are from the 2005 Working Plan, the 2006 Baseline, or other sources. This will continue to be typical of the results without schedule integration required to develop effective iterations for solutions to such mismatches.

EM-33, the arm of DOE responsible for planning and execution of DOE required actions to provide the GFS/I, is actively engaged in developing their portion of the schedule. Additionally, they are working closely with the K-H staff, with RFFO and with the K-H schedule output to integrate the two schedules. In parallel, K-H is in the process of rebaselining Project Baseline Description (PBD) F (titled *Material Stewardship Project*). This is the project ultimately receiving materials from the other K-H projects, and the one from which GFS/I need dates are determined. More remains to be done in order to achieve integration of the K-H GFS/I needs with the EM-33 maintained GFS/I supply dates. This is discussed in more detail in Appendix C.

> General Recommendation GR-SC1: Accelerate efforts to complete integration of GFS/I dates and PBD F rebaselining into the K-H maintained project baseline schedule; recommend completing as soon as possible.
>
> Once integrated, use it as a living tool to status project progress and monitor performance for pro-active evaluation of problem areas including mismatches, and coordination between project members to develop work around solutions. (This must be a joint effort by both K-H and RFFO and EM-33 staff).

At this point it is worthy to note that K-H developed and maintains, a risk analysis of the project schedule and cost. This analysis focuses on the K-H contract scope of work. The process includes schedules and cost estimates developed by K-H to support their 2005 Working Plan. Monte Carlo, a Primavera program, that links directly to Primavera Project Planner (P3) schedule activities, was used to perform risk analysis simulation techniques on the activity schedules. Each activity was graded on a scale from 1 to 5 for risk, and then run through Monte Carlo. This resulting schedule approximated, and was used as the basis for, the 2006 Baseline.

The approach normally used to estimate project cost risk consists of obtaining estimates for individual activities (i.e., high, low, and most probable). This is followed by fitting probability distribution functions to these estimates, establishing correlations between elements, and then probabilistically summing the individual distributions into a project wide cost distribution utilizing Monte Carlo simulation techniques. When implementing this approach, a majority of the work activities normally entail quantifiable units of materials and labor hours to execute.

The numbers and costs of landlord activities and support staff functions complicate performing cost risk analysis for the Rocky Flats Closure Project. These activities (roughly $2.8B of the $4B cost estimate) do not have quantifiable units, yet they drive the overall cost. Therefore, implementation of the normal approach would be of questionable value under these conditions.

With respect to cost risk applied to the Rocky Flats Closure Project, algorithms were then written to apply risk analysis results from the schedule to the cost estimate in the K-H *Basis of Estimate System (BEST)* using the Work Breakdown Structure. Resulting K-H cost contingencies applied to cost estimate elements represented the difference between Working Plan estimated costs and the $657M funding for the additional year, or a maximum attainable fee for K-H.

The value of the risk analysis is not so much in providing a quantitative measure of what to expect as much as it is in determining areas of risk, and in developing risk mitigation plans. Although K-H has done all of this, the effort has been limited only to the K-H scope of work. Further, when it comes to GFS/I, since this is a DOE responsibility and not within the K-H scope of work, the analysis simply assumes the GFS/I will be provided when needed.

> General Recommendation GR-SC2: Following completion of GFS/I schedules and PBD F rebaselining into the K-H maintained project schedule to create an integrated schedule, re-evaluate project risks and required risk mitigation plans.

The discussion of Appendix B also notes that individual projects show large positive floats, that this is probably not realistic, and that the root cause of the problem may be that that lower level activity relationships are not properly depicted within the schedule.

> General Recommendation GR-SC3: Review and confirm activity relationship logic for those areas where it appears to be questionable.

### 3.1.3.2 Summary Conclusion Regarding Accuracy of Schedule

Definitive conclusions regarding the ability to meet the December 15, 2006 target completion date should not be made until the GFSI dates and PBD F rebaselining dates are integrated into a truly integrated K-H maintained project schedule. Also, as was previously noted in the discussion of the cost, there are on-going problem issues that have not been totally dispositioned (i.e., PuSPS and changes to the WIPP WAC) that could result in a stretch out the schedule. As is the case with the reasonableness of the cost estimate, however, the most significant opportunity to reduce both costs and schedules, while maintaining safety standards, is in the area of simplifying work requirements and practices and thereby reducing the attendant large landlord and staff support costs (reference General Recommendations GR-C2, GR-C3 and GR-C4).

### 3.1.4 Adequacy of Management Controls

Even if a project has an executable scope, cost and schedule, this does not assure that it will be successfully completed. Therefore, in addition to assessing the Interim Closure Project Scope, Cost and Schedule, Burns and Roe was also tasked to review the following:

- Project Management: Review of the management controls being employed to assure that Closure will be completed within the project baseline cost and schedule.

- Risk Analysis: Assess the risks associated with the Closure Project being completed as planned.[19]

- Safety: Assess if safety standards can be maintained with the Closure Project being completed as planned.

Within the context of this report, Management Controls includes the following: (a) project organization, roles and responsibilities, and staffing, and (b) the management control systems utilized by the staff to assist them in controlling execution of the project within the defined technical, cost and schedule baseline while maintaining safety. Within this context, risk analysis/management and safety management are addressed as two of several management control tools.

The remainder of this section will address Project Organization, Roles and Responsibilities, and Staffing (Section 3.1.2.1); and Management Control Systems (Section 3.2.2).

### 3.1.4.1 Project Organization, Roles & Responsibilities, and Staffing

This topic will be addressed with respect to two areas; i.e., DOE and K-H, with a majority of the discussion focused on DOE.

**DOE:** As is noted in Section 2, the review methodology involved interviews with many of the RFFO personnel. One of the questions asked of each person was "if you were in charge, what actions would you take to improve operations." Many of the personnel responded with "develop and issue a formal statement of organizational roles and responsibilities."

Section 1 addresses DOE's dual roles and responsibilities as both (a) the traditional client/ contract over-sight manager, and (b) project performing roles primarily with respect to supplying GFSI, obtaining regulator reviews and approvals, and assuring safety. Also, external receiver sites have specific supporting roles and responsibilities. This all makes having a clear definition of roles and responsibilities even more important.

Issues of roles and responsibilities are usually addressed in the most effective manner by having the participant organizations constitute an Integrated Project Team and having this team develop, and obtain their organizational senior management approval of, a Project Execution Plan (PEP). Not only is this an effective practice, but DOE Order 413.3, *Program and Project Management for the Acquisition of Capital Assets*[20] requires a PEP.

[19] Risk Analysis has already been addressed as it relates to the project scope, cost and schedule. It is addressed again in this section with respect to means by which the process might be improved.

[20] Although titled " ... *for the Acquisition of Capital Assets*", the order is applicable to EM Projects as evidenced by specific inclusion of items unique to EM Projects.

Recommendations for how to develop a PEP are provided in the DOE OECM draft documents titled, *Program and Project Management*, and *Project Management Practices*.

Issues normally addressed within a PEP include (a) Mission Statement, (b) Project Technical, Cost and Schedule Baselines, (c) Organizational Roles and Responsibilities, and (d) Over-view of key management controls requirements; e.g., Baseline Change Controls, Performance Measurement Reporting, Safety Management, Configuration Management, etc). Given the uniqueness of this project, special issues to consider in the development of this PEP include:

- Designation of Executive (i.e., EM-1/2) Sponsor, and a Project Executive Committee (e.g., heads of other receiver sites, RFFO Manager, and perhaps K-H RFET CEO)[21]
- Roles and Responsibilities; listed previously, but for this project starts at top (e.g., EM-1/2 to resolve intra DOE and DOE/DP interface problems, etc)[21]
- Reporting relationships (e.g., perhaps GFSI should report to EM-1/2)[21]
- In addition to "Interim Closure", another project end-point is to establish a "Long Term Stewardship Plan"
- Inclusion of how this project will provide "a corporate EM memory" for application of best practices and approaches to future EM Closure Projects (e.g., EM-33, with RFFO)

> General Recommendation GR MC-1: Utilizing DOE Order 413.3 and the general guidance of the DOE OECM draft *Program and Project Management*, and *Project Management Practices* documents, develop and implement a Project Execution Plan that addresses the issues identified above. Obtain major project participant buy-in to the PEP.

With respect to more detailed issues of functional staffing at RFFO and EM, there are two additional observations and recommendations.

At RFFO, although personnel are not prohibited from accessing a Local Area Network where the project cost and schedule data reside, they do not have the required tools to access schedule data. Also, there are no Project Controls (i.e., cost estimating, and cost & schedule reporting) professionals on the RFFO staff to help interpret and question project cost and schedule data.

> General Recommendation GR MC-2: Either back-fill RFFO attrition with Project Control (i.e., Cost Estimating, and Cost & Schedule Reporting) professionals, or

[21] GAO report GAO-01-284, dated February 2001, addressed "Cleanup and Closure of Rocky Flats". The report highlighted "concerns about DOE's ability to effectively implement its plan because no strategy is in place to identify and resolve problems. Two components are missing – a clearly established authority for reconciling competing demands for DOE's resources and a process for limiting the amount of time that a problem or conflict can languish unresolved." Incorporating these three items into a PEP would address this problem.

consider contractor support. Also, provide proper tools (i.e., Primavera licenses) to support RFFO access to project schedule data.

Within EM there is inadequate staffing of the GFSI function in terms of providing support for developing and maintaining GFSI cost and schedule reports, and for ensuring that risk assessments properly address the uncertainties associated with DOE's providing GFSI. Also, given the importance of the GFSI activities, additional staff at RFFO to facilitate real time statusing and integration of K-H GFSI needs and DOE's ability to deliver is warranted.

General Recommendation GR MC-3: There are three related recommendations as follows:

- Supplement staff support of the GFSI activities at EM with Project Controls professionals.
- Establish a greater site presence of the GFSI function to facilitate real time statusing and problem solving of GFSI requirements.
- Consider having the EM GFSI function reporting directly to EM-1/2.[22]

**K-H:** Given the nature of the DOE/K-H interim closure contract, K-H is highly incentivized to provide an optimal organizational structure and staffing of this structure. Section 1 notes how they have provided a highly projectized structure, with strong incentives to its area Project Managers. The only observation in this area is that although this structure has served them well in getting things rolling, they may have perhaps over-done projectization with the down-side risk being they may not be providing for optimized site wide planning (addressed previously) and may not be learning how to best apply successful approaches/lessons learned from one area to others.

General Recommendation GR-MC-4: K-H consider (either within the current structure with additional management controls, or through slightly altered management structures) providing for improved application of lessons learned into future work planning. Also, consider integrating planned actions in response to this recommendation with actions planned in response to GR-C2, GR-C3 and GR-C4, and an RFFO lessons learned effort (see GR-MC-5 in next section).

[22] The PEP needs to address EM roles vis a vis field roles. For example, one comment at EM was that they have a line responsibility for Safety, and BR (together with RFFO personnel who were questioned on this issue) do not know what that means. BR's opinion is that (a) GFSI, given the multi-site nature of its work, should report to EM 1/ 2, and (b) traditional EM roles (e.g., project funding sponsor to congress, external reporting to DNFSB, etc) should be retained. In addition, the Rocky Flats Interim Closure Project is supposed to be serving as a template for future clean-up projects, and BR believes that EM should be playing a very strong role in developing a "corporate memory" of best practices to be applied to future closure projects.

### 3.1.4.2 Management Control Systems

Many of the more important aspects of management controls have already been addressed to some extent in other sections of this report. For example, Project Cost Estimating is discussed in Appendix A and in Section 3.1.2, Project Scheduling in Appendix B and in Section 3.1.3, the K-H Contract and Earned Value/ Performance Reporting in Section 3.1.2. Also, Risk Management has been addressed in the discussion of project scope, cost and schedule.

Although not strictly a Management Control issue, an area that should be improved is the need for a visible, active Lessons Learned program within the RFFO function. From a near term perspective, there may be experiences on a particular project or aspect of closure that would be beneficial for others to know to avoid the same mistakes or inefficiencies. Capturing these and publicizing/communicating the details on a current basis should be an assigned responsibility to be undertaken now.

For the longer term, successful closure of this site is a priority of the DOE, one that the Department is expecting to use as a template for other such endeavors. Learning from successes and mistakes must be captured on an on-going basis to achieve this.

> General Recommendation GR-MC-5: DOE-RFFO assign responsible staff for, and implement now, a Lessons Learned program. Regularly communicate the elements of the program and the need to provide lessons learned on a real time basis. Coordinate where possible with K-H lessons learned activities (see GR-MC-4).

A final area that warrants improvement, and Management Control Systems is a viable means of achieving the improvement, is DOE/ K-H Partnering. Five recommendations have been provided thus far that reflect a need to improve teaming efforts; i.e.,

- General Recommendation GR-S1: Addresses expansion of the Risk Management process to include scope risks that are beyond the K-H contract scope of work
- General Recommendation GR-C2: Addresses the need for a concerted effort to simplify work practices and thereby significantly reduce landlord costs.
- General Recommendation GR-C3: Addresses the need to pro-actively develop facility D&D plans that are focused on providing a more optimized approach to achieving D&D, and the associated safety requirements.
- General Recommendation GR-C4: Addresses the need for site wide strategic planning.
- General Recommendation GR-SC1: Addresses the need to accelerate efforts to jointly develop the integrated schedule of K-H need and GFSI supply dates.

Based on interviews with the RFFO Site Manager, and with the K-H CEO, it is clear that they are in strong agreement that an effective partnership between DOE and K-H is a

necessary prerequisite to successful project execution. Although clear at their level, the message is less clear at the lower levels.

Frustration was apparent during many discussions with RFFO Project leads regarding their inability to effectively implement what they perceive as their responsibilities as relates to partnering/supporting/being supported by/working with their counterparts. In many cases working understandings or agreements are developed between the counterparts, only to be overturned as "management" gets into the act. They've heard the term "partnering", but generally think it's not working for them.

Because of the importance of improved DOE/K-H partnering to the successful execution of the project, in addition to the General Recommendations noted above, additional recommendations are provided in this regard as follows:

> General Recommendation MC-6: Improve project wide communications by establishing performance goals/ metrics and a periodic status (via official project bulletin board postings) of achievements versus these metrics.
>
> General Recommendation MC-7: Develop procedures (e.g., change control/ REA processing) to encourage counterparts to resolve issues and problems.
>
> General Recommendation MC-8: Consider professional facilitation of high impact, complex problem issues.
>
> General Recommendation MC-9: Institutionalize Risk Management as an on-going, real-time, process that encompasses all project risks (and not just K-H contract risks). To this end, consider establishment of a joint DOE/K-H Risk Management Committee, with a defined charter, and periodic reporting to management (e.g., at Monthly Project Reviews).

### 3.1.4.3 Summary Conclusions Regarding Adequacy of Management Controls

Many general recommendations have been provided which, if successfully implemented, would greatly enhance the ability achieve Interim Closure of the Rocky Flats Site within the target cost and schedule. In general, the recommendations reflect a need for (a) a more formalized approach to planning and executing the DOE scope of work, and (b) streamlining work requirements and approaches through efforts that require teaming between K-H and DOE.

| Table 3.1-1; Observations and Recommendations, Integrated Summary | | | |
|---|---|---|---|
| **General** | | **Supporting** | |
| **Observation** | **Recommendation** | **Observation[23]** | **Recommendation** |
| The current Risk Management Process is focused on cost and schedule risks as they relate to the contract scope of work; therefore, it does not envelope all project risks | **GR-S1:** Expand the Risk Management Process to include project scope risks that are beyond the K-H contract scope of work. For these items, be sure that the process (a) identifies the scope risk items, (b) provides a documented basis of their potential impacts, and (c) ensures sufficient actions are being taken to either mitigate them, or (if necessary) integrate them into the baseline plans. | **D-8:** The PBD estimates recovering about 1,100 $M^3$ of uncontaminated recycle metal. With the recent restriction by the DOE on the release of this material, the ultimate disposition and cost to dispose of this material may be significantly affected. | It is recommended that the estimated cost for disposition of uncontaminated recycle metal be updated to be consistent with the new DOE restrictions. |
| | | **E-1:** In the last two years of the project, 300 buildings and 400 other structures need to be D&D. The team found no definitive plans that addressed the specifics of how this would be accomplished. No contingency plans exist if some of these building or structures are unexpectedly contaminated. Availability of sufficient personnel and resources in the allotted time frame is a concern. | Develop detailed definitive plans that include the resources needed, allowance for contingencies and options for decontamination and decommissioning of these buildings and structures by December 2006. |
| | | **E-3:** Total uncontaminated steel is ~19,000 tons. Since it cannot be recycled, the costs of disposing this quantity of metal as LLW could be more than $100 million. These costs are not in the K-H baseline project costs. | The disposal of this steel should be definitized and the costs associated with it should be formalized. |

[23] Observations and Recommendations in this table are summarized. See the specific section for the full text.

| Table 3.1-1; Observations and Recommendations, Integrated Summary | | | |
|---|---|---|---|
| General | | Supporting | |
| Observation | Recommendation | Observation[23] | Recommendation |
| | | **E-4:** The seasonal leaking of contaminated ground water along the building footprints and elsewhere is a generic issue that may exist even after closure since it is caused by hydrostatic pressures exerted by rainfall and snow. The effect of such leakages on the surface water quality is currently unknown. | Model in the actinide migration studies, seasonal discharges of ground water that might affect the quality of surface water. |
| | | **F-4:** Project E that handles all the uncontaminated steel for the entire RF Closure Project has identified 19,000 tons of uncontaminated steel that based on DOE moratorium cannot be recycled. Even though the costs for the disposal of this steel will appear under Project E, Project F will undertake the shipment of this material. | D&D of Building 771 is at an advanced stage and experience gained from the continuing operations should be used as a feedback to maintain an accurate forecast of waste volumes anticipated.<br><br>Also, include the quantities of uncontaminated steel that need to be disposed of as LLW or LLM. Determine the impact of these additional volumes on packaging and shipping containers, characterization and transportation needs. |
| | | **F-5:** While K-H liability is limited to the contract specified volumes, the project runs the risk of having to handle large volumes should the contamination below the Buildings exceed the assumed levels. | Investigation of the under building contamination should be expedited to confirm the waste volumes to be handled under ER Project G. |

| Table 3.1-1; Observations and Recommendations, Integrated Summary | | | |
|---|---|---|---|
| General | | Supporting | |
| Observation | Recommendation | Observation[23] | Recommendation |
| | | **G-5:** The surface water quality is intimately linked with not only soil cleanup levels but also what is buried underground as well as the ground water that leaks to the surface This issue will be addressed in the actinide migration study. | Ensure that the subject of seasonal ground water leakages is directly included in the actinide migration studies or is enveloped by the imposed boundary conditions in the studies. |
| | | **G-11:** It has not yet been determined if the pond liners can remain when the ponds are capped, and if this is not the case, then the liners will need to be removed and disposed off-site. | The decision related to removal of pond liners should be made early. |
| | | **G-12:** The final soil cleanup levels decision scheduled for implementation this year are not factored into the schedule. This decision leading to determination of final soil cleanup levels will be based on several factors and ultimately in consultation with the regulators and stakeholders. | Identify and track activities that will result in establishing final soil cleanup action levels in calendar year 2001. |
| | | | |
| There is extensive documentation of the required work activities for the K-H scope of work. This is also true for DOE GSF/I activities. However, there is a lack of formal identification of DOE required work activities and their status for all other DOE areas of responsibility including the Environmental and Regulatory activities. | **GR-S2:** DOE RFFO provide documented identification, planning and status of major environmental activities; i.e., (a) activities required to finalize clean-up requirements, (b) activities required to achieve regulator approvals of planned and completed clean-up activities, and (c) any other regulatory issues, actions, or interactions. | **G-1:** The RFCA SOP for Soil Remediation shows that there are 7,400 ft of Old Process Waste Line and New Process Waste Line piping beneath buildings with basements. These are inaccessible lengths of piping that will have contamination stabilized in place and the piping left in place. | Provide identification and basis of the twenty percent of OPWL/NPWL piping to be removed, and justify non-removal of the 7,400 ft of piping beneath the basements. |

| Table 3.1-1; Observations and Recommendations, Integrated Summary | | | |
|---|---|---|---|
| **General** | | **Supporting** | |
| **Observation** | **Recommendation** | **Observation[23]** | **Recommendation** |
| | | **G-2:** The RFCA SOP for Soil Remediation states that pipelines that are stabilized in place will be subject to post-closure performance monitoring and controls, and that groundwater monitoring will also be performed. We saw no groundwater monitoring at and around any buried and stabilized piping. | Review ground water monitoring requirements for areas around stabilized pipelines, and ensure required monitoring is being performed. |
| | | **G-3**: Unless the final soil cleanup levels are agreed to in a timely manner by all parties involved including the regulators and the stakeholders and included in the revised RFCA, the cost impacts could be substantially higher than currently projected. Schedule impacts could also be anticipated. | The soil final cleanup levels should be incorporated into RFCA in FY2001 to facilitate effective site closure planning (and thereby minimize cost and schedule impacts). |
| | | **G-4:** Should the final soil cleanup levels be made more restrictive, K-H is not planning to revisit sites for which remediation is deemed to be completed and a report for NFA was filed with the regulators. This approach entails risk. | As part of the process for establishing final cleanup requirements (ref: Observation and Recommendation G-12), address with regulators the potential impact of final cleanup requirements on already filed reports for NFA. |
| | | **G-6:** The differences between the positions taken by K-H and the regulating agencies with respect to "No Action" must be resolved in an expeditious manner. If remediation is required for some of the sites it should be recognized early to minimize schedule impacts. | K-H meet with the regulatory agencies such that they can understand, be sensitive to, and responsive to the regulatory agencies' requirements for declaring "No Action" at a given site. |

| Table 3.1-1; Observations and Recommendations, Integrated Summary | | | |
|---|---|---|---|
| General | | Supporting | |
| Observation | Recommendation | Observation[23] | Recommendation |
| | | **G-7:** Differences exist in the K-H understanding and the expectations of the regulators for a site to be declared NFA. | K-H/RFFO meet with the regulatory agencies to ensure they understand, can be sensitive to, and be responsive to the regulatory agencies' requirements for declaring a site NFA. Also, RFFO must assign a RFFO team the responsibility to coordinate and facilitate the efforts for timely approval of the NFA by the regulators. |
| | | **G-8:** The ER process includes filing (a) an RFI/RI, along with a recommendation for No Further Action, or (b) filing proposed clean-up actions, and then filing a closeout report, both followed by regulator approval of No Further Actions. Identification and scheduling of final regulator approvals was not evident in the review of the PBD and schedules, nor was the lead responsible party. | Identify, schedule, and assign lead responsibilities for activities required to secure regulator approval of No Further Actions. |
| | | **G-9:** The assumption that engineered caps are an integral part of the Site's environmental closure strategy, and the regulatory agencies will agree to the use of evapo-transpiration caps is based on work done at Sandia Labs and Rocky Mountain Arsenal sites in the US. | K-H/RFFO enter into an early dialogue with the regulators as to the acceptability of evapo-transpiration caps under conditions prevalent at the Rocky Flats site. |

| Table 3.1-1; Observations and Recommendations, Integrated Summary | | | |
|---|---|---|---|
| General | | Supporting | |
| Observation | Recommendation | Observation[23] | Recommendation |
| | | **G-10:** The Original Landfill is planned to be capped. The baseline estimate assumed that the slopes around the landfill were stable. It has turned out that the steep soil buttress may not lend stability to the cap, and that this element would entail removal of 75,000 yards of contaminated soil. | The costs associated with the disposal of contaminated soil in the Original Landfill should be formalized. |
| | | | |
| The planned use of overtime is significant and it is assumed that productivity rates will be the same as for straight time. This may not be realistic. | **GR-C1:** Either (a) re-examine and lower planned overtime, or (b) consider how to incentivize contractors to improve productivity. | **ABC-7:** These projects have overtime (OT) work built into the cost estimates in amounts of 18% to 20% for the D&D and waste processing activities to achieve the project schedule and to achieve better worker productivity. When working in full anti-c's, working longer does not necessarily achieve greater productivity due to the fatigue and stress of working in such an environment. | The use of OT needs to be carefully examined. If the productivity gains are not achieved, more staff should be hired to reduce the need for OT and schedule changes will have to be made to make up for the loss of productivity failure to achieve the planned schedule goals. |
| | | **D-7:** Overtime is planned at a level of about 26% of the total cost for craft labor on the planned Alternative Work Schedule with a twelve-hour work shift. This comes at the higher overtime rate, and a possible loss of efficiency because of greater fatigue near the end of the longer workday. The longer work-shift could also adversely affect safety because of the greater level of fatigue. | The use of a 12-hour shift should be reviewed against other multiple shift/overtime modes to see if the potential benefits are actually realized as a reduction in schedule at reasonable cost without sacrificing safety. |
| | | | |

| Table 3.1-1; Observations and Recommendations, Integrated Summary | | | |
|---|---|---|---|
| **General** | | **Supporting** | |
| **Observation** | **Recommendation** | **Observation[23]** | **Recommendation** |
| There are several areas for potential substantial cost reductions relating to site work requirements and practices as compared to commercial practices that result in excessive landlord costs, use of specialty labor categories, and generally high manning levels. | **GR-C2**: Undertake a concerted effort to simplify work practices and thereby significantly reduce landlord and other support costs. Consider a RFFO/K-H teaming effort, setting goals, modifying work requirements and implementing practices, and measuring the results in terms of decreased cost and schedule estimates. Consider using an outside, professional facilitator. | **ABC-3:** It appears that the project may be suffering from the "not invented here" syndrome. There are several examples of techniques that are common to the commercial nuclear decommissioning world that have only recently been implemented or seriously considered for this project. | The project should investigate using commercial D&D approaches, such as the "cold and dark" concept and greater use of demolition laborers. Hiring a commercial D&D consultant could facilitate this objective and attending conferences that cover D&D work might also provide other new methodologies. |
| | | **ABC-4:** The projects are using electricians to remove or demolish electrical equipment. In commercial nuclear D&D work, once an item is de-energized, laborers perform the actual demolition. Also, skilled steelworkers are performing much of the size reduction work that would be done by laborers in commercial work. | Work rules need to be examined and revised to facilitate the use of demolition labor instead of skilled craft for this work. Wherever possible, the work rules should be changed to be more cost-effective. |
| | | **ABC-5:** It appears that there is a high ratio of "watchers" (or oversight personnel) vs. actual D&D workers on the project. | The work rules and makeup of the staffing needs to be reviewed to obtain a higher ratio of D&D workers compared to oversight "watchers". |
| | | | |

| Table 3.1-1; Observations and Recommendations, Integrated Summary | | | |
|---|---|---|---|
| **General** | | **Supporting** | |
| **Observation** | **Recommendation** | **Observation[23]** | **Recommendation** |
| There is evidence of pro-active D&D planning for the site over-all. However, this is not apparent at the individual Building (facility) level. Here it is planned at a high level although the work eventually is planned in the work packages. This process fails to plan the work in an optimal manner. | **GR-C3:** Pro-actively develop Facility D&D Plans that are focused on providing a more detailed approach to achieving D&D, and the associated safety requirements. Consider forming teams of representation from the K-H and DOE project(s) and safety organizations. Also consider lessons learned from similar facility D&D. | **ABC-6:** The independence of the closure projects does not always work toward a cost-effective operation of the closure projects. I.e., there is no formal method of handling "lessons learned" between the projects.<br><br>Also, many of the documents prepared for the different projects contain a great deal of duplicate information. I.e., all of the DOPs have long narrations of various decommissioning techniques and processes. This information is redundant from document to document. | More coordination between the projects needs to be achieved. The recent combination of the management of the 707 & 776/777 projects (the 700 club) into one project management is a good move to better coordinate analogous work on different building clusters. A more formal method of transferring lessons learned between projects would also be helpful. |
| | | **ABC-8:** It is planned to fully decontaminate significant portions of the concrete structures so that they can be turned over for standard concrete demolition. If this approach cannot be achieved in a cost-effective manner, the final demolition costs and schedules will be at risk. Recent commercial nuclear plant experience has been that it is not cost effective to decontaminate the concrete. Also, the planned use of explosives to bring down the Building 771 stack and to knock down some of the heavier concrete construction may not be practicable or achievable within the site's prerequisites for their use. | The planned decontamination of the concrete needs to be closely monitored. If the planned approach is not generally achievable, there is the potential for large schedule and cost impacts occurring in the last year of the project. Alternatives should also be explored. |

| Table 3.1-1; Observations and Recommendations, Integrated Summary | | | |
|---|---|---|---|
| General | | Supporting | |
| Observation | Recommendation | Observation[23] | Recommendation |
| | | **D-2:** Recent safety occurrences involving cutting into live electrical lines have resulted in a heightened focus on safety. However, even with the heightened emphasis on safety, the aggressive approach to D&D could lead to lapses in safety and result in injury to workers and contract penalties and delays. | Improvements in safety planning and work activities will require further direct involvement of dedicated Project safety personnel, heightened oversight by Project "H" safety professionals and RFFO to see that the recent safety improvements continue. |
| | | **H-1:** The influence of EES&QP into the individual Projects could be more pro-active. There seems to be a disconnect between the guidance provided and the application of Safety and Quality concerns in the individual Projects. | EES&QP participate directly in reviewing and approving related Project activities, and provide some field oversight. Safety policies, requirements and issues need to be communicated to all tiers. |
| | | **H-2:** There needs to be system of checks and balances to determine if EES&QPs guidance is being followed by the task groups and integrated into their various plans; these plans meet contractual requirements; and/or these plans meet the minimal regulatory requirements. | As a minimum, EES&QP assign one appropriate individual to work directly with the task group for plan preparation of these plans, and EES&QP formally review and approve at least 10% of these plans. |
| | | **H-3:** It is not clear if EES&QP provides field oversight during actual field operations, i.e., D&D, remediation, etc. to determine if policies, procedures and plans are being followed. | EES&QP develop and implement a plan to provide field oversight of operations. |

| Table 3.1-1; Observations and Recommendations, Integrated Summary | | | |
|---|---|---|---|
| General | | Supporting | |
| Observation | Recommendation | Observation[23] | Recommendation |
| | | **H-4:** We were advised that reportable accidents trended up last year. However, we were unable to obtain specific accident rates, comparison of their accident rates with similar industry or Workman's Comp ratings – items we believe should be closely tracked and managed by EES&QP. | EES&QP take a more proactive role in accident and safety violation prevention and their interactions with DOE in these areas. EES&QP track and maintain accident rates, industry comparisons of rates, and Workman's Compensation ratings, and then use these data to strengthen their program. |
| | | **H-5:** Safety violations trended up last year, which could relate to the upward trend in reportable accidents. Reducing the number of reportable accidents and safety violations, which pose unacceptable risks to workers, and which can also result in lengthy shutdowns that interrupt cleanup activities, must be a high priority. | EES&QP track and maintain safety violation rates, and then use these data to strengthen their program. |
| | | **H-6:** EES&QP has instituted an Accident Investigation Program. However, they do not have a Near-Miss Accident Investigation Program. | EES&QP develop and implement a Near-Miss Accident Prevention Plan. |
| | | | |

| Table 3.1-1; Observations and Recommendations, Integrated Summary | | | |
|---|---|---|---|
| General | | Supporting | |
| Observation | Recommendation | Observation[23] | Recommendation |
| With the highly projectized over-all approach, many of the projects are for the most part being pursued in parallel. This results in Landlord and other support costs remaining at a relatively high level late into the project. Also, the shipments of wastes increases dramatically toward the end of the project. | **GR-C4:** Consider pursuit, and documentation of, site-wide strategic planning to ensure that site wide closure project planning issues are being addressed in an optimum manner. | **ABC-1:** The DOPs and PMPs for each PBD provide a manual of information on known decommissioning techniques for many different components and wastes but the Integrated Work Control Procedures (IWCPs) and detailed working schedules provide the detailed work plans. However, there does not appear to be a master-planning document that truly integrates the work from these various projects. | A truly integrated project work schedule should be developed to optimize the work activities with the objective of minimizing costs and schedule. |
| | | **ABC-2:** The landlord, management and overhead (LOE) costs appear to be excessive, and savings achieved here could be reallocated to D&D work. | A concentrated effort, similar to the consolidation of the site Protected Area, should be made to reduce these landlord, management and overhead (level of effort) costs. For the overall project, early closure of non-contaminated or less contaminated structures would reduce the landlord costs. |
| | | **ABC-9:** These projects lack milestones for achieving a "criticality incredible" status. Since much of the landlord costs are driven by the criticality monitoring, and surveillance and monitoring (S&M) of the facility to protect against criticality, the sooner a criticality incredible condition is achieved, the sooner the landlord costs can be significantly reduced. | Milestones should be established for achieving criticality incredible status in these facilities. A formal milestone will provide a definitive objective to be achieved by the D&D work. |

| Table 3.1-1; Observations and Recommendations, Integrated Summary | | | |
|---|---|---|---|
| General | | Supporting | |
| Observation | Recommendation | Observation[23] | Recommendation |
| | | **D-1:** The *Set Completion Schedule by FY* has a number of Glovebox Sets, Equipment Sets, Tank Sets, and Equipment/Room Sets that are planned for completion in FY05. Contaminated equipment being dismantled so late in the Project requires maintaining high levels of radiological controls, use of health physics technicians, continued need for relatively expensive steelworkers, and reduced efficiency while working in protective clothing. Also, with the earlier removal of plutonium contamination, the need for support systems such as nitrogen purge, UPS, and fire support could be reduced. | The planned strategy for Set completion should consider if all Sets involving contaminated gloveboxes, equipment, tanks, and associated piping can be removed at the beginning of the Project. In that way, the later stages of decontaminating remaining structures may be possible with a reduced need for radiological controls and its consequences. |
| | | **D-3:** The implementation of some activities in B776/777 have been scheduled. However, although risks associated with the uncertainties for this effort may have been addressed in cost planning, the unknowns could affect both the logic duration and therefore, represent schedule risks. | Detailed planning of the high-risk activities should be developed early to ensure that these risks are bounded and acceptable. |
| | | **D-4:** A major observation is that the WBS divisions for deactivation and program management vary significantly from PBD "A, "B" and "C". | With the combining of the Building 707 and 776/777 Projects, it is recommended that this be considered an opportunity to reduce the combined PM costs and become more consistent with the other Buildings Projects. |

| Table 3.1-1; Observations and Recommendations, Integrated Summary | | | |
|---|---|---|---|
| General | | Supporting | |
| Observation | Recommendation | Observation[23] | Recommendation |
| | | **D-5:** Building Operations is about 23% of the total cost for Project "D", which is similar to dismantling an operating facility rather than the other extreme of a cold and dark dismantlement. The high cost of facility management of the 776 complex seems to be at odds with cost and schedule effective D&D. | Early closure of the 776 complex should be evaluated. |
| | | **E-1:** In the last two years of the Project, ~300 buildings and 400 other structures need to be D&D. This may or may not be a realistic plan. We saw no definitive plans that addressed the specifics of how this would be accomplished, and that there were no contingency plans should some of these buildings or structures be unexpectedly contaminated. | The Project should develop detailed definitive plans that include the resources needed, allowance for contingencies and options for D&D of these buildings and structures by December 2006. |
| | | **E-2:** Landlord activities continue for these large numbers of buildings until they are ready for decontamination and decommissioning in 2004 and beyond. The landlord costs do not contribute to the ultimate desired outcome to demolish the buildings. | The Project should conduct a study to optimize total project costs by prioritizing building demolition and evaluating optimum funding allocation to Project "E". |
| | | **H-8:** EES&QP costs are included in individual Projects as well as in Project "H". Thus, the total staff engaged in EES&QP activities goes beyond the staff levels included in the Project. Current costs for EES&QP are below the budget. Unless | Review the planned Project level-of-effort (LOE) in the cost baseline and match staffing plans with actual work products to be developed, and required support to be provided. |

| Table 3.1-1; Observations and Recommendations, Integrated Summary | | | |
|---|---|---|---|
| General | | Supporting | |
| **Observation** | **Recommendation** | **Observation[23]** | **Recommendation** |
| | | additional staff is needed to provide recommended added direct involvement in oversight of plans and field activities, future spending is likely to remain under budget. | |
| | | | |
| K-H maintains a project schedule for their contract scope of work. However, it does not include the critical DOE activities leading to supply of the GSF/I products. Therefore, an integrated project schedule depicting and providing status of all activities needed to successfully attain interim closure, does not exist. Both K-H and DOE staff indicated that they are working toward creating an integrated schedule, but until this effort is completed, it cannot be conclusively stated that the schedule of closure activities is complete. | **GR-SC1:** Accelerate efforts to complete integration of GFS/I dates and PBD F rebaselining into the K-H maintained project baseline schedule; recommend completing no later than July 1, 2001.<br><br>Once integrated, RFFO, K-H and EM-33 use as a living tool to status project progress and monitor performance for pro-active evaluation of problem areas including mismatches, and coordination between project members to develop work around solutions. | **F-6:** Project "F" assumed that the treatment and disposal of orphan wastes will be provided by DOE. Their characterization and quantities should be identified in the GFS/I interface. Since their characterization and treatment will probably not satisfy project schedule needs, DOE, RFFO and K-H should develop packaging and transportation plans for untreated orphan wastes to another DOE site. | Since it is questionable whether characterization and treatment of orphan wastes would be developed in a timely manner, DOE, RFFO and K-H should consider alternative packaging and transportation plans for moving untreated orphan wastes to another DOE site before the closure date of 2006. |
| | | **G-13:** The project typically provides a window of three months following preparation of a decision document to allow for review by DOE, public the Decision Document Agency. Subsequent to this review the remediation action is implemented and finally the close out report is written and approved by DOE. Approval of the closeout report by regulators is not shown on the | Based on earlier observations related to delays in obtaining approval of the regulating agency for "NFA" or "No Action" , the project should include the effect of delays on project costs and schedules in Risk Assessment. |

| Table 3.1-1; Observations and Recommendations, Integrated Summary | | | |
|---|---|---|---|
| General | | Supporting | |
| Observation | Recommendation | Observation[23] | Recommendation |
| | | schedule. | |
| | | | |
| K-H developed and maintains a risk analysis of the project schedule and cost but limits it only to K-H scope of work. The analysis assumes that the GFS/I will be provided by DOE when needed. This therefore, is an incomplete analysis of the risk. | **GR-SC2:** , Re-evaluate project risks and required risk mitigation plans following completion of GFS/I schedules and PBD F rebaselining into the K-H maintained project schedule. | **F-1:** Rail transportation of Low Level Waste (LLW) and Low Level Mixed Waste (LLM) is a segment of the material disposal that seems attractive. Railroad transportation of these wastes is less expensive than transport by trucks. Also, it improves health, safety and environmental issues. A dedicated train could transport the same amount of waste as 240 trucks. Statistically, the possibility of a transport accident increases as the number of transportation events increase. | Alternative transportation needs should be evaluated. Consider the environmental, safety, cost and schedule benefits of rail versus truck transportation of LLW, given the increase in truck transportation activity based on the significant material stewardship activity compacted in last two years of the closeout of the project. |
| | | **F-2:** A significant efficiency can be achieved by employing a radiological survey approach called "Bulk Survey for Release". This process involves the survey of large quantities of material after it is already packaged within a container. | KH/RFFO evaluate possible use of the bulk survey for release of waste for disposal especially when considering large volume shipments. |
| | | **F-3:** Industry is continually presenting innovative approaches to address waste processing, transportation and disposal issues. Among these developments are new disposal options. | Stay current with evolving waste processing, packaging, transportation and disposal developments and incorporate into project planning where justified. |
| | | | |
| Individual project schedules show large positive floats that are probably not realistic. The root | **GR-SC3:** Review and confirm activity relationship logic for those areas where it appears to be | | |

| Table 3.1-1; Observations and Recommendations, Integrated Summary | | | |
|---|---|---|---|
| General | | Supporting | |
| **Observation** | **Recommendation** | **Observation[23]** | **Recommendation** |
| cause of the problem may be that that lower level activity relationships are not properly depicted within the schedule. | questionable | | |
| | | | |
| The DOE has not developed a PEP to address project mission, baselines, organizational roles and responsibilities, and management controls requirements. The uniqueness of this project suggest addressing additional special issues. | **GR MC-1:** Utilizing DOE Order 413.3 and the general guidance of the DOE OECM draft *Program and Project Management*, and *Project Management Practices* documents, develop and implement a Project Execution Plan that addresses the identified issues. Obtain major project participant buy-in/approval. | **H-7:** The RFETS IMP details the Site programs for water, air and ecology monitoring activities to be performed for legal, contractual and operational purposes. This document represents agreements with the EPA, Colorado, and localities on the requirements for the data to be collected. The IMP is noted not to have a document number, Revision number, date, or approval signoffs. | Control documents important to the Project in a manner to ensure that current revisions are being used and that the document has been approved and signed off for use. |
| | | | |
| At RFFO, although personnel are not prohibited from accessing a Local Area Network where the project cost and schedule data reside, they do not have the required tools to access schedule data. Also, there are no Project Controls (i.e., cost estimating, and cost & schedule reporting) professionals on the RFFO staff to help interpret and question project cost and schedule data. | **GR MC-2:** Either back-fill RFFO attrition with Project Control (i.e., Cost Estimating, and Cost & Schedule Reporting) professionals, or consider contractor support. Also, provide proper tools (i.e., Primavera licenses) to support RFFO access to project schedule data | | |
| | | | |
| Within EM there is inadequate staffing of the GFSI function in | **GR MC-3:** There are three related recommendations: | | |

| Table 3.1-1; Observations and Recommendations, Integrated Summary | | | |
|---|---|---|---|
| General | | Supporting | |
| Observation | Recommendation | Observation[23] | Recommendation |
| terms of providing support for developing and maintaining GFSI cost and schedule reports, and for ensuring that risk assessments properly address the uncertainties associated with DOE's providing GFSI. Also, given the importance of the GFSI activities, additional staff at RFFO to facilitate real time statusing and integration of K-H GFSI needs and DOE's ability to deliver is warranted | • Supplement staff support of the GFSI activities at EM with Project Controls professionals.<br>• Establish a greater site presence of the GFSI function to facilitate real time statusing and problem solving of GFSI requirements.<br>• Consider having the EM GFSI function reporting directly to EM-1/2 | | |
| | | | |
| The K-H organizational structure has served them well in getting things rolling. However, they may have over-done projectization with the down-side risk being they may not be learning how to best apply successful approaches/ lessons learned from one area to others. | **GR-MC-4:** K-H consider providing for improved application of lessons learned into future work planning. Also, consider integrating planned actions in response to this recommendation with actions planned in response to GR-C2 and GR-C3.<br><br>K-H capture lessons learned in support of the RFFO program discussed in GR-MC-5. | **D-6:** Demolish B776/777 and Out Buildings, is estimated at approximately $24.2 million developed from the estimated area (225,000 sf) and the unit cost from the RISS Facility Decommissioning Cost Model (FDCM) Rev. 3a. Use of Rev. 0 of the FDCM, September 2000, would reduce the cost for this Activity. | The general use of parametric costing for Decommissioning in the CPB may be inappropriate at this stage of the Project. Resulting costs are basically order of magnitude with corresponding uncertainty. However, the cost for this Activity ID could be improved using the more detailed data and experience that is now be available for the Project. |
| | | | |
| There is need for a visible, active Lessons Learned program within the RFFO function. Near term, there may be experiences on a particular project or aspect of closure that would be beneficial for others to know to avoid the same mistakes or inefficiencies. | **GR-MC-5:** DOE-RFFO assign responsible staff for, and implement now, a Lessons Learned program. Regularly communicate the elements of the program and the need to provide lessons learned on a real time basis. Coordinate where possible with K-H lessons learned activities (see | **ABC-10:** The PuSPS problem may lead to cost increases and schedule stretch-out. It appears that DOE should<br>attempt to learn from the PuSPS experience in terms of what constitutes good and bad procurement practices. Also, given that the Rocky | Formalize a DOE lessons learned program for application to other DOE Closure Projects, and include a review of PuSPS within this program effort. |

| Table 3.1-1; Observations and Recommendations, Integrated Summary | | | |
|---|---|---|---|
| General | | Supporting | |
| **Observation** | **Recommendation** | **Observation[23]** | **Recommendation** |
| For the longer term, learning from successes and mistakes must be captured on an on-going basis to be useful for future projects. | GR-MC-4). | Flats Closure Project is to serve as a template for how to manage future closure projects, this issue becomes even more relevant. | |
| | | | |
| It is apparent that top management of both DOE and K-H are in agreement that effective "partnering" is a necessary prerequisite to successful project implementation. However, this message is less clear at the lower levels. Frustration is evident in discussions with Project Leads in both organizations regarding the inability to effectively implement what they perceive as their "partnering" responsibilities. | Four supporting recommendations:<br>**GR-MC-6:** Improve project wide communications by establishing performance goals/ metrics and a periodic status (via official project bulletin board postings) of achievements versus these metrics.<br>**GR-MC-7:** Develop procedures (e.g., change control/ REA processing) to encourage counterparts to resolve issues and problems.<br>**GR-MC-8:** Consider professional facilitation of high impact, complex problem issues.<br>**GR-MC-9:** Institutionalize Risk Management as an on-going, real-time, process that encompasses all project risks (and not just K-H contract risks). To this end, consider establishment of a joint DOE/K-H Risk Management Committee, with a defined charter, and periodic reporting to management (e.g., at Monthly Project Reviews). | | |

## *3.2 B371/374, B707, and B771/774 Closure Projects (Projects A, B and C)*

### 3.2.1 Statement of Work (Projects A, B and C)

These three closure projects encompass the deactivation and decommissioning of three of the major facility/areas of the site. Many of the issues associated with these three projects are the same and therefore, rather than repeating items, all three are discussed collectively in this section. The exception to this is cost and schedule that are discussed for Project A here, and for Projects B and C in Sections 3.3 and 3.4 respectively.

The B371 Project also includes considerable processing activities, including the operation of the Pu Stabilization and Packaging System (PuSPS) and the processing of various other residues. These three projects have a combined budget of $865 million that is about 22% of the total Rocky Flats Closure Project budget. These projects also account for approximately 28% of the "Contract Fee Activities", i.e., the real deactivation and decommissioning work for the Closure Project. A brief description of the scope of work for each of these projects is provided in the following subsections.

#### A. B371/374 Closure Project

- Development and installation of size reduction capacity
- Operation of the Pu Stabilization and Packaging System
- Removal of 80 special gloveboxes (shielded or with large equipment)
- Removal of 312 tanks, 88 Raschig Ring Tanks
- Removal of 776 miles of process piping, duct, and conduit
- Removal of 24 filter plenums
- Removal of 361,000 $ft^3$ of high contamination rooms
- Removal of 33 standard gloveboxes
- Stacker/retriever vault
- Deactivation and decommissioning of the facilities

#### B. B707 Closure Project

- Ash residue process
- Dry residue process (IDCs 300, 303, and 312)
- Metal/oxide processing (including 53 orphans/11 targets)
- Removal of 100 standard and 50 special gloveboxes
- Removal of 1200 linear feet of chainveyor
- Removal of 44 tanks and 17 plenums
- Over a mile of ducting and several miles of piping
- Deactivation and decommissioning of the 707 cluster

### C. B771/774 Closure Project

- Special Nuclear Material removal, liquids removal and building deactivation/stabilization
- Removal of gloveboxes, tanks, plenums, piping etc.
- Deactivation and decommissioning of the 771/774 building cluster

As can be seen from the above summaries, the overall scope is extensive, but there is a great deal of similarity between the projects. In terms of overall completion, the B771 project is the furthest along towards completion and the B371 project will be the last to be completed, since it is receiving Plutonium and Special Nuclear Material from other buildings and will have possession of these materials until they can be shipped offsite. To facilitate the decommissioning work on the other buildings, and to consolidate the Protected Area (PA) around B371, the site recently realigned the PA so it will exist only around building B371. This move also reduces the overall total of security personnel needed to be on-site and its associated costs.

The scopes of these three projects are defined in the Project Management Plan (PMP) and Decommissioning Operations Plan (DOP) for each project. These documents are somewhat analogous to the decommissioning plans that commercial nuclear power plants have to prepare for the NRC and State review. Among these six documents, there is a great deal of duplication of information, but their content level of detail and organization also varies between the different projects. This is clear evidence that much of the planning work was done as completely independent projects with little coordination between them.

Both the PMP and the DOP are higher-level documents used primarily for obtaining approvals to proceed from various regulatory agencies. The overall work scope for these facilities is defined in these documents. While they have a lot of information relating to decommissioning techniques to be used, it is general information and does not specify how any specific parts of the work in the buildings should be performed. They are guidance and facility characterization documents. Also, these documents, and discussions with site personnel indicate that the end points for these facilities are not fully defined by these documents in relation to the final site endpoints. Rather the scope of work under these projects ends with the removal of the structures to a few feet below the existing floors.

### 3.2.2 Activities and Work Approach (Projects A, B and C)

In general, the work is proceeding in an acceptable manner. Standard deactivation and decommissioning methods and techniques are being utilized to perform the work. These techniques are getting the job done, but the work is running behind schedule. For example, as of March 2001, there are schedule variances of –45.4%, -10.2%, -41.3% and –23.1% for the 371, 707, 771 Complex Projects and the overall closure project respectively. These figures are from the March 2001 Closure Project Baseline "Contract Fee Activities-Fee Schedule Variance Report", i.e., the real deactivation and

decommissioning work. These across the board negative variances indicate that the work is not being performed at the expected or required rates, thereby jeopardizing on-time and on-schedule project completion. Although there are many reasons stated for these variances in the project cost and schedule performance reports, this is an indication that the deactivation and decommissioning approaches, methods and techniques need to be optimized to achieve greater productivity. The Burns and Roe review of PBDs A, B, and C noted a number of items in this category that are in need of reassessment as a means of making the closure of these PBDs more cost and schedule effective. These included the following:

1. Parallel and almost independent D&D of the three PBDs.
2. Excessive landlord, management and overhead (LOE) cost.
3. Slow implementation of proven commercial deactivation and decommissioning (D&D) techniques.
4. Use of skilled labor (electricians) vs. laborers for demolition work.
5. High ratio of "watchers" vs. actual D&D workers.
6. Independence of the PBD D&D projects.
7. Planned use of overtime as a cost and productivity basis.
8. Decontamination of concrete.
9. Lack of milestones for achieving "criticality incredible" status in the facilities.

Each of these items will be discussed in more detail below as observations with associated recommendations, in the same order as listed above. Following these nine items, a separate discussion is provided regarding the procurement of PuSPS.

**Observation ABC-1:** The DOPs and PMPs for each PBD provide a manual of information on known decommissioning techniques for many different components and wastes. They are not the detailed work plans for the work. Integrated Work Control Procedures (IWCPs) and detailed working schedules provide these instructions. However, there does not appear to be a master-planning document that truly integrates the work from these various projects on a strategic or site-wide basis. For example, the closure of the B371, B707 and B776 clusters occurs within about a one-year duration. Completing three major projects so close to each other creates significant potential for problems related to delays, site congestion and trying to complete too much work on a compressed timeline.

As shown in the chart below, Figure 3.2-1, there is a tapering of the landlord costs over the course of the projects. This chart was created by plotting the Facility Management costs for the four PBD's, although these are not the total landlord costs and are shown at considerably lower values than their actual costs (see discussion in paragraph 3.2.3 for further explanation). The chart does indicate the tapering trends and major reductions, and the tapering parallels the closure of the building clusters. For example, the PBD C/B771 cluster is completed at the end of FY04 and the chart shows that the landlord costs drop dramatically between FY03 and FY04. Likewise, the landlord costs take another dramatic drop between FY05 and FY06, which happens to correspond to the completion of the PBD's A/B371, B/B707, and D/B776 clusters. This is an indication that the projects' significant landlord costs (see discussion in paragraph 3.2.3) are not

eliminated until just before a facility cluster is demolished. Thus, running many projects in parallel (as is the current approach) tends to extend the need for cumulative landlord costs, since most of the demolition work finishes in the last 12 months to 18 months of the project.

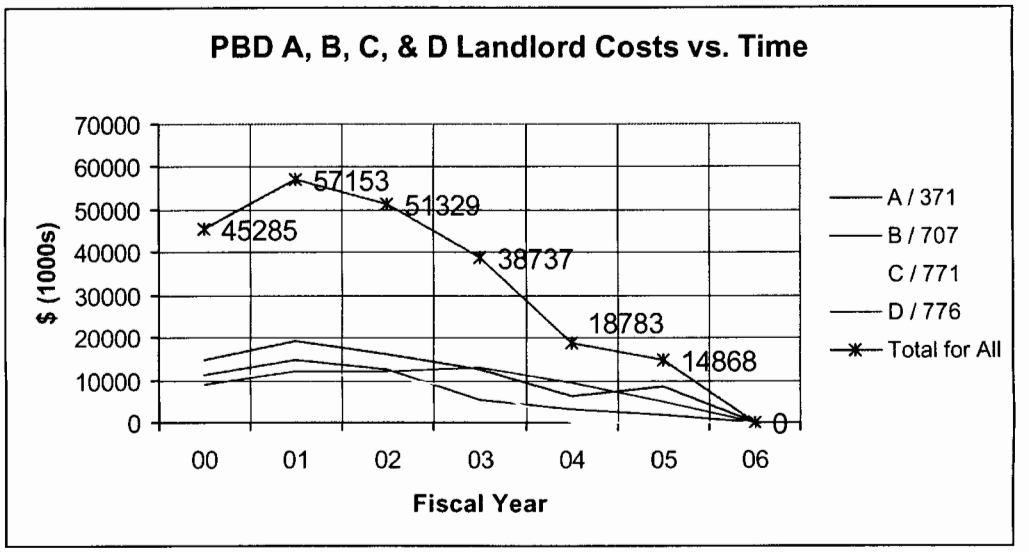


**Figure 3.2-1, Project A, B, C and D Annual Landlord Costs**

Recommendation: A truly integrated project work schedule and site-wide D&D planning document should be developed to optimize the work activities with the objective of minimizing costs and schedule. The plan should minimize risks by considering the use of series work activities, particularly relating to demolition of the various building clusters with an aim toward reducing landlord costs as rapidly as possible. This may require conducting the D&D work more in series, rather than as parallel projects. Every dollar of landlord cost savings is a dollar that can be reallocated to decommissioning work. The plan must also consider lessons learned, the site, its accesses and sources of disposing of wastes, potential on-site congestion, and labor availability.

### Additional Supporting Observations

In the following chart, Figure 3.2-2, the total project cost as a function of eight (8) categories of work skills and cost accounting, have been separated. The chart is based on the $4 billion closure budget and groups various related costs together to present a picture of the level of effort and landlord type activities vs. activities that are directly related to deactivation and decommissioning work. As shown by this comparison, 33% of the total budget is devoted to landlord, ISM, management and other overhead or level of effort activities, i.e., non-D&D activities. Actually, the non-D&D activities percentage is even higher, since the "none" segment actually contains level of effort and management activities in the subcontractors costs, the "craft, techs & operators" also contain workers devoted to landlord operations, and some of the indirect and paid absence costs are also related to the landlord costs. However, it was not possible to separate these items from

the available cost data breakouts. The significant point Figure 3.2-2 demonstrates is that the management and level of effort type costs are conservatively estimated to be significant (higher than 33%) and higher than expected for a decommissioning project and in fact higher than what would be expected for new construction. A good example of how this 33% segment of the budget can be reduced was the recent reduction of the "protected area".

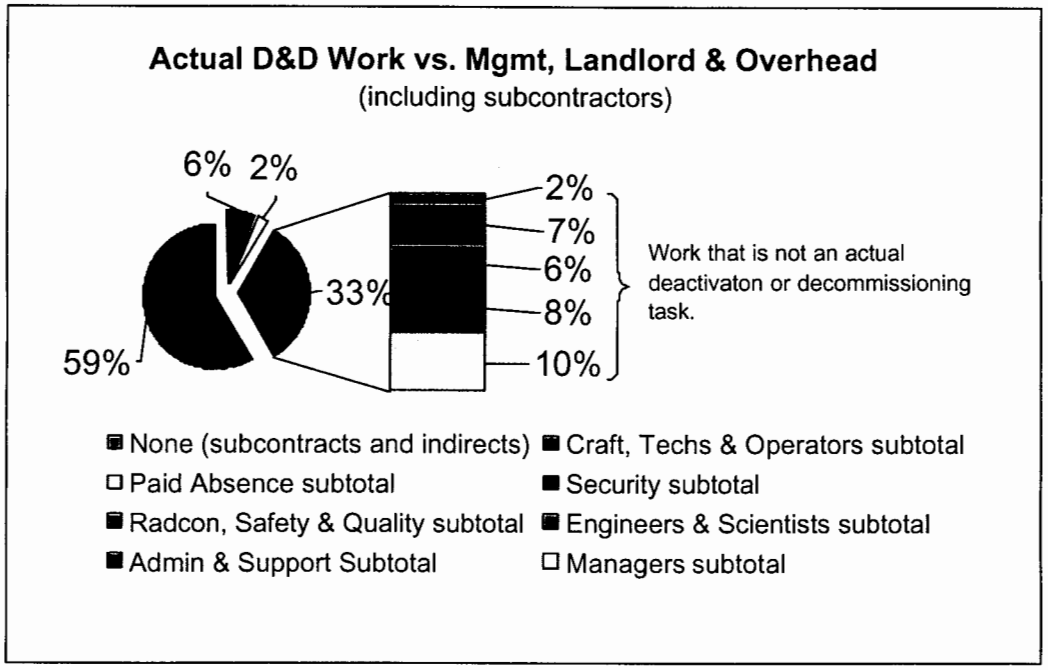


**Figure 3.2-2, Total Project Cost Breakdown**

Landlord costs are also significant on this closure project. The following two charts, Figures 3.2-3 and 3.2-4, display the landlord costs vs. all other non-landlord costs. The first chart shows the landlord costs related to the entire project cost ($3.992 billion) and the second relates the landlord costs for just PBD A (bldg. 371), B (bldg. 707), C (bldg. 771) and D (bldg. 776).

These charts show that for the overall closure project, landlord related costs amount to a minimum of 12.8%, while for the PBD's A, B, C, and D they total a minimum of 20%. As shown, this is a significant portion of the budgets for this work. These are minimum estimates of the landlord costs since they do not include many landlord related costs that could not be separated out of other cost rollups for inclusion in the landlord cost segment. For example, some of the management costs are clearly landlord costs since a considerable amount of management is needed for such a large budget. Another large cost item not included in the above landlord costs are the indirects and subcontracts that are all lumped in to the "none" category. Clearly, some of these are also part of the total landlord costs. In fact, during our discussions with K-H personnel, it was stated that the

landlord or surveillance and monitoring related costs amounted to as much as $350 million per year. If this is the case, the actual percentages of landlord related costs are considerably higher.

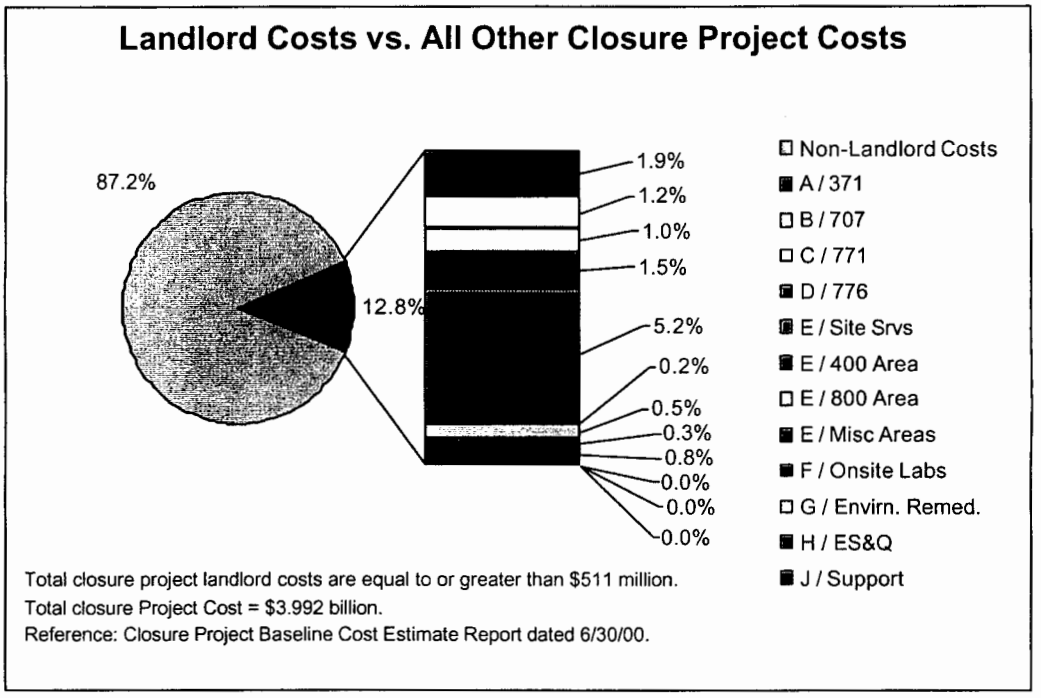


**Figure 3.2-3, Total Project Landlord Costs**

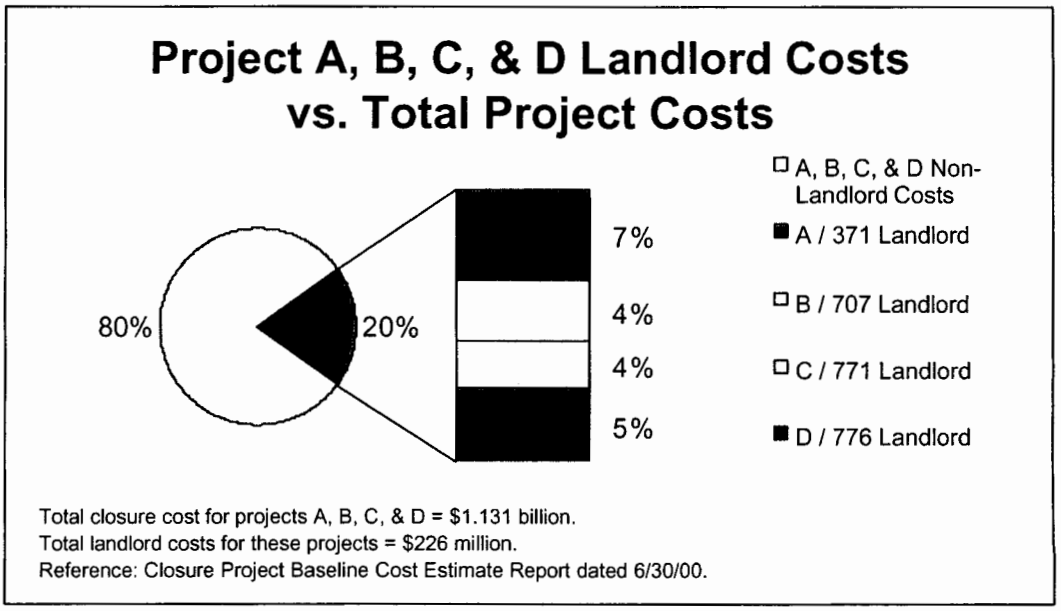


**Figure 3.2-4, Landlord Costs for Projects A, B, C and D**

**Observation ABC-2:** In light of the preceding, the landlord, management and overhead (LOE) costs appear to be excessive, and savings achieved here could be reallocated to D&D work.

Recommendation: A concentrated effort, similar to the consolidation of the site Protected Area, should be made to reduce these landlord, management and overhead (level of effort) costs. For the overall project, early closure of non-contaminated or less contaminated structures would reduce the landlord costs. For the major PBD's, earlier closure of any of the facilities would also reduce these costs. For example, PBDs A, B and D are all scheduled for cluster closure within 7 months of each other.

**Observation ABC-3:** It appears that the project may be suffering from the "not invented here" syndrome. There are several examples of techniques that are common to the commercial nuclear decommissioning world that have only recently been implemented or seriously considered for this project. These include:

- Using hand held plasma arc torches to cut up stainless steel components. The use of such torches to cut stainless steel components has long been practiced in the commercial industry, but has only recently been implemented for glovebox cutting on this project.
- Placing buildings in a "cold and dark" status. The commercial D&D industry has widely used the concept of placing the facilities to be decommissioned in a "cold and dark" status prior to the full D&D of the facility. "Cold and dark" status consists of de-energizing all or nearly all of the electrical circuits in the facility and repowering the facility with temporary construction power. This enables the demolition work to proceed safely, since all power cables, except for the construction power and possibly items such as cranes, are de-energized. It also minimizes the use of electricians on the project by allowing laborers to do all of the electrical systems demolition (if electrical components are not energized, laborers take them out).
- Use of skilled crafts for demolition work instead of laborers. For commercial nuclear demolition, laborers perform most of the work. This is not the case at Rocky Flats (see OBS ABC-3 for further discussion of this issue).

  Recommendation: The project should investigate using commercial D&D approaches, such as the "cold and dark" concept and greater use of demolition laborers. Hiring a commercial D&D consultant could facilitate this objective and attending conferences that cover D&D work might also provide other new methodologies.

**Observation ABC-4:** Using electricians for demolition work instead of laborers. The projects are using electricians to remove or demolish electrical equipment, i.e., if it was installed by electricians, it is removed by them. In commercial nuclear D&D work, once an item is de-energized, laborers perform the actual demolition. Also, skilled steelworkers are performing much of the size reduction work that would be done by laborers in commercial work. This work arrangement appears to be something of a

carryover of the work rules that existed when the facility was operating. This arrangement is costly to the project. For example, electricians account for 17% or approximately $24 million of the total project "skilled craft" labor costs. This is a very high utilization of electricians for a decommissioning project.

Recommendation: Work rules need to be examined and revised to facilitate the use of demolition labor instead of skilled craft for this work. Wherever possible, the work rules should be changed to be more cost-effective.

**Observation ABC-5:** It appears that there is a high ratio of "watchers" (or oversight personnel) vs. actual D&D workers on the project. For example:

- Examination of Figure 3.2-2 shows the total percentage of "watchers", i.e., personnel that oversee portions of the work, including ISM (industrial safety and radcon) and quality assurance personnel. The chart shows that they comprise 7% of the total budget, or approximately $275 million. This amount is greater than the total dollars for the craft, technicians and operators that are doing actual deactivation and decommissioning work. If the cost of the mangers, engineers and scientists are also included as part of the "watchers" budget, the percentage of "watchers" grows to 23% or approximately $0.9 billion. While these same personnel also oversee the work of the subcontractors, the subcontractors will also have their own managers, engineers, safety and quality assurance personnel, thereby increasing the percentage of "watchers". This percentage is very high for a D&D project, and would be on the high side for management and oversight, even for new construction projects.
- The total number of radcon technicians is very high on all three of the projects. PBD's A/371, B/707, and C/771 each average approximately 67, 41, and 42 radcon technicians each year of the project respectively. In each of these three projects, the radcon technicians account for nearly 18% of the total man-hours budgeted for these closure projects. Compared to the work on commercial D&D projects, this high percentage of radcon work is excessive and cannot be a cost-effective use of resources.

  Recommendation: The work rules and makeup of the staffing needs to be reviewed to obtain a higher ratio of D&D workers compared to oversight "watchers".

**Observation ABC-6:** Independence of the PBD D&D projects. The independence of the closure projects does not always work toward a cost-effective operation of the closure projects. For example:

- There is no formal method of handling "lessons learned" between the projects. The current process is a monthly executive strategy meeting or just word-of-mouth. Thus, work procedures and methods sometimes have to be relearned from project to project.
- Many of the documents prepared for the different projects contain a great deal of duplicate information. For example, all of the DOPs have long narrations of various decommissioning techniques and processes. This information is

redundant from document to document, but since it is all presented differently, it was probably developed multiple times. This is not a cost-effective way to prepare the project documentation.

Recommendation: More coordination between the projects needs to be achieved. The recent combination of the management of the 707 & 776/777 projects (the 700 club) into one project management is a good move to better coordinate analogous work on different building clusters. A more formal method of transferring lessons learned between projects would also be helpful. See also Observation ABC-1.

**Observation ABC-7:** These projects have overtime (OT) work built into the cost estimates in amounts of 18% to 20% for the D&D and waste processing activities. It was stated that the OT was utilized to both achieve the project schedule and to achieve better worker productivity. When working in full anti-c's, working longer does not necessarily achieve greater productivity due to the fatigue and stress of working in such an environment. In general, OT can achieve schedule commitments and increased productivity on a short-term basis. To plan for 20% of the work to be on an OT basis is a long-term proposition and its effectiveness has not been established. Using OT at premium pay on a long term basis does not appear to be cost-effective; if so much extra work needs to be performed, it seem that more straight time workers should be incorporated into the work force.

Recommendation: The use of OT needs to be carefully examined. If the productivity gains are not achieved, more staff should be hired to reduce the need for OT and schedule changes will have to be made to make up for the loss of productivity failure to achieve the planned schedule goals.

**Observation ABC-8:** Decontamination of concrete. It is planned to fully decontaminate significant portions of the concrete structures so that they can be turned over for standard concrete demolition, e.g., use of explosives or standard wrecking shears, crushers, etc. If this approach cannot be achieved in a cost-effective manner, the final demolition costs and schedules will be at risk. Recent commercial nuclear plant experience at the Trojan and Saxton Nuclear Plants has been that it is not cost effective to decontaminate the concrete. In the Trojan case, they found that it was more cost effective to remove and bury as low level waste, all of the containment building contaminated concrete. In the Saxton case, the utility spent a great deal of time and money tying to decontaminate the concrete so the remainder could be free released. This attempt failed and they are now forced to go back and remove all of the concrete. Also, the planned use of explosives to bring down the building 771 stack and to knock down some of the heavier concrete construction may not be practicable or achievable within the site's prerequisites for their use. Explosives have not found widespread acceptance in the commercial D&D. This is partly due to public perception and the need to ensure that the exploded structure is contamination free.

Recommendation: The planned decontamination of the concrete needs to be closely monitored. If the planned approach is not generally achievable, there is

the potential for large schedule and cost impacts occurring in the last year of the project. Alternatives should also be explored.

**Observation ABC-9:** These projects lack milestones for achieving a "criticality incredible" status. Since much of the landlord costs are driven by the criticality monitoring, and surveillance and monitoring (S&M) of the facility to protect against criticality, the sooner a criticality incredible condition is achieved, the sooner the landlord costs can be significantly reduced.

Recommendation: Milestones should be established for achieving criticality incredible status in these facilities. A formal milestone will provide a definitive objective to be achieved by the D&D work.

### 3.2.2.1 Plutonium Stabilization and Packaging System (PuSPS)

**Background**

Operation of this system is part of Project A (Building 371). This system is to be utilized for stabilizing and packaging all unclassified Plutonium and Plutonium Oxide material prior to its being shipped to the Savannah River Site. Processing the material through PuSPS is not only a pre-requisite requirement to shipping the material off-site, but it also (a) satisfies a commitment made in response to the Defense Nuclear Safety Board (DNFSB) recommendation number 94-1, and (b) is on the critical path to site closure.

Operation of the system will result in Pu and Pu oxide material being placed into containers (roughly 700 containers for the Pu, and roughly 1300 containers for the Pu oxide). The shape of a container is a right circular cylinder, slightly longer (and narrower) than a football.

Procurement of this system was initiated by DOE in 1994 and it is being supplied as a GFS/I item. The procurement has a long history of problems. This review effort has not attempted to completely document the details of the procurement effort, but did observe the following:

**PuSPS Design**

- Although not explicitly within the Burns and Roe scope of review, it does appear that the design has undergone many changes. For example, over the years the automated portions of the stabilization process were eliminated, as were many of the automated portions of the packaging process. In general, the greater the magnitude of changes that are made to a vendor supplied system, the less accountable the vendor becomes.
- Frustration was expressed regarding not being able to take credit for leak tightness, and thus leading to a more complicated PuSPS operation.

**PuSPS Procurement, and Closure Contract, Responsibilities**

- RFFO personnel who were interviewed regarding PuSPS firmly believe that DOE turned over ownership of PuSPS to K-H. Within this concept of ownership, they also believe that should there be cost and schedule impacts associated with the operation

of the system, that K-H could not seek a Request for Equitable Adjustment (REA) to the closure contract.[24]

- Whether remedies were sought from the PuSPS supplier (BNFL) for performance problems is not clear.

**PuSPS Operations**

- When Burns and Roe departed the site on May 11th, PuSPS was still not operable, and was roughly 1 year behind schedule.
- Currently, there are no back-up plans in case PuSPS experiences further problems.

**Observation ABC-10:** This problem may very well lead to cost increases and schedule stretch-out. Additionally, it is not clear whether BNFL truly met its contract responsibilities. Burns and Roe considered it beyond its scope to review these issues. Independent of this however, it does appear that DOE should attempt to learn from the PuSPS experience in terms of what constitutes good and bad procurement practices. Also, given that the Rocky Flats Closure Project is to serve as a template for how to manage future closure projects, this issue becomes even more relevant

Recommendation: Formalize a DOE lessons learned program for application to other DOE Closure Projects, and include a review of PuSPS within this program effort.[25]

### 3.2.3 Cost Estimate: Process, Procedures/Details (Project A)

#### 3.2.3.1 Cost Methodology (Project A)

Area "C" assisted in the cost estimating efforts of Building 371. The baseline cost and schedule were recently redone in April 2001. The cost estimate reflects very closely to the efforts of Area "C" and their baseline methodology.

Refer to Building 771/774 cost write-ups for more detailed description of the baseline costs.

#### 3.2.3.2 Cost Review (Project A)

Baseline costs for Building 371 are close to the average for the four areas A to D. Since the baseline was redone with more details formulated using the same methodology as Building 771/774, the cost appear to be well prepared and consistent with project guidelines and procedures.

[24] Having an REA approved would increase the target cost and schedule (and perhaps the incentive fees). Without the increases, K-H would have a more difficult time earning maximum fees.
[25] As part of the effort to generate the Project Execution Plan, it is suggested that EM-33 have a strong involvement in this effort.

### 3.2.4 Schedule (Project A)

Project schedules were reviewed with K-H Project Controls personnel for PBD A, B371/374, which includes activities on the project critical path through material stewardship and environmental restoration to interim closure on 12/15/06. In addition, with the delay in PuSPS, related activities are in a negative float situation against the milestone for Protected Area Closure. Discussions included the following:

- Project Organization – The B371/374 closure project has a Project Manager as its lead with technical areas reporting to him including residues, SNM removal, PuSPS, facility disposition (decontamination and decommissioning), and 374 waste operations. Project Controls includes cost, schedule, workweek management, and contracts/procurement that report to the Project Controls lead. Administration and EESH&Q additionally provide support to the Project Manager. There are a total of 595 personnel of which 35 are K-H direct salaried.

- Cost Estimate Basis for Authorizing and Budgeting Project Activities – The cost estimate is primarily based on using data in the Revision 3A Baseline estimate from the previous contract and adjusting it for revised scope under the new contract. In addition, cost estimates were developed for new scope activities based on vendor quotes and historical cost.

- Cost Account Plans – There are 10 cost accounts, each with a cost account manager responsible for budgeting and reporting earned value against activities. Level of effort activities, with earned value equal to scheduled work budget, are statused by the central Planning and Integration group, who are responsible for the overall project schedule and evaluation of data from each K-H project. Detailed activities by sets and areas were developed at levels below the project schedule for B371/374 and roll up to support that schedule. Pre-determined work activities represent deliverable work and are used as the basis for determining fee. The majority do not earn full value until completed. Separate reports were reviewed for the pre-determined work activities and were found to be consistent with established guidelines.

  The B371 project also has a workweek manager, who provides status against a Plan of the Day/Week Schedule, drawing upon each of the technical areas from B371. This provides a very detailed basis for statusing schedule progress and works well for B371, but is not consistent with what is being done on the other K-H projects.

- Variance Reporting – Variances are recorded similar to other projects and provide input to the monthly progress report for discussion between K-H and RFFO.

- EESH&Q Interface – PBD H (EESH&Q) provide an interface function to the B371 project. EESH&Q personnel are assigned directly to and charge B371. There are also personnel in PBD H who provide environmental and regulatory requirements input to B371 and charge B371 accordingly.

Environmental and regulatory interface issues were discussed and it was concluded that the necessary schedule interfaces have been identified against B371/374 activities.

- Changes (REAs) – Requests for Equitable Adjustments (REAs) are scheduled and estimated off-line within the K-H Planning and Integration System consistent with established guidelines. These activities and costs are not incorporated into the baseline until approved.

- Interface with RFFO and Other K-H Projects

  **Observation ABC-11:** There is an RFFO counterpart to B371, who coordinates with K-H. This effort is primarily technical and is effective in identifying problems and workarounds between K-H and RFFO. The B371 project also interfaces informally with other K-H projects on an as required basis including lessons learned.

  Project Control personnel interfacing with B371/374 from RFFO would provide an on-board understanding of specific project schedule and cost issues and would facilitate a more pro-active and timely approach to problem resolution.

  Also, there are no formal guidelines for K-H to interface and document actions between other K-H projects. This would provide a more consistent basis for each project to function within the framework of the overall project schedule and would serve as the vehicle for each project to interface with the other projects and benefit from lessons learned.

  Recommendations: Establish RFFO guidelines or procedures for effective and consistent RFFO interface with K-H. Also, establish formal guidelines for K-H to interface and document actions between the other K-H Rocky Flats closure projects.

## *3.3 B707 Closure Project (Project B)(Cost and Schedule Details)*

The discussion of the scope, and the activities and approach to the work for Projects A, B, and C, are discussed collectively in Section 3.2 since many of the issues associated with these three projects are the same. The Cost and Schedule discussions for this project are included in this section.

### 3.3.1 Statement of Work

See Section 3.2

### 3.3.2 Activities and Work Approach

See Section 3.2

### 3.3.3 Cost Estimate: Process, Procedures/Details (Project B)

#### 3.3.3.1 Cost Methodology (Project B)

Independent of the other areas, PBD "B" assembled their own cost estimate. The cost estimate details were prepared in accordance with the guidelines established in the K-H *Cost Engineering and Cost Estimating Manual.* Unit costs and rates for productivity used in the estimate were based on actual historical information that was adjusted for the specific conditions and quantities evaluated for the scope of work. Historical costs were taken from similar activities from Building 779 & 771. Estimating software *Powertool,* contained most of the historical data that was reviewed, validated, modified, and then applied towards Building 707's specifications. All remaining costs have been estimated in a level of effort method based on historical on-site experience and previous K-H contract costs. Factors were applied to the cost of labor to account for miscellaneous equipment, material, and supplies for all D&D work. Cost units used were factored using estimator's judgments to account for learning curves, repetition of tasks, and quantity variances within each activity or set.

#### 3.3.3.2 Cost Review (Project B)

Costs (by %) for PBD "B" are in the middle of cost percentages for areas "A", "C", & "D" as shown in Table 3.3-1. Some of these cost differences are due to the inconsistencies created by each area acting independently of each other in the manner in which they created their cost breakdowns through the use of sets and activities. Area "A" baseline costs were estimated on a more detailed level somewhere in between the methodologies of Areas "C" & "D". Enough detail exists to provide an adequate baseline cost estimate for this level.

**Table 3.3-1, PBD A to D PM, FM, D&D % of Totals**

| | PBD A | | PBD B | | PBD C | | PBD D | | PBD A-D TOTALS | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $, M | % of Total | $, M | % of Total | $, M | % of Total | $, M | % of Total | $, M | % of Total |
| **Program Management** | 14 | 4 | 28 | 11 | 6 | 3 | 39 | 15 | 87 | 8 |
| **Facilities Management** | 76 | 21 | 49 | 18 | 41 | 18 | 58 | 22 | 224 | 20 |
| **Deactivation/ Decommission** | 23<br>176 | 6<br>48 | 15<br>159 | 6<br>60 | 15<br>89 | 7<br>39 | 3<br>134 | 1<br>50 | 56<br>558 | 5<br>49 |

### 3.3.4 Schedule

Project schedules were reviewed with the PBD B, B707 K-H Project Controls Manager. The following areas were discussed and evaluated:

- Project Organization – The B707 Project is merging with the B776/777 Closure Project under one K-H vice president. The organization is comprised of engineering/planning/safety, operations/D&D, cost and scheduling, and a deputy to the vice president. The B707 project includes approximately 370 personnel and is similar to B776/777.

  The merger of B707 and B776 is a positive step in consolidating work under one K-H lead. This will result in a more consistent basis not only for managing scope, but also cost and schedule including performance measurement.

- Cost Estimate Basis for Authorizing and Budgeting Project Activities – The cost estimate is primarily based on using data in the Revision 3A Baseline estimate from the previous contract and adjusting it for revised scope under the new contract. In addition, cost estimates were developed for new scope activities based on vendor quotes, historical cost and parametrically.

- Cost Account Plans – There are 7 cost accounts, each with a cost account manager responsible for budgeting and reporting earned value against activities. Level of effort activities, which earn value equal to scheduled work budget, are statused by the central Planning and Integration group, who are responsible for the overall project schedule and evaluation of data from each K-H project. Detailed activities were developed at lower levels by module below the project schedule level. There are module managers for these, who developed scope using ICWPs. Project Controls developed cost and schedule based on the ICWPs, which roll up to support the project schedule. Pre-determined work activities represent deliverable work and are used as the basis for determining fee. The majority do not earn full value until completed. Separate reports were reviewed for the pre-determined work activities and were found to be consistent with established guidelines.

These detailed schedules, which are in P3, and detailing module deactivation activities, provide the day-to-day visibility required for effective project statusing and reporting. Further, the project verifies status by observing actual progress in the field.

- Variance Reporting - Variances are recorded similar to other projects and provide input to the monthly progress report for discussion between K-H and RFFO.

- Changes (REAs) – Requests for Equitable Adjustments (REAs) are scheduled and estimated off-line within the K-H Planning and Integration System consistent with established guidelines. These activities and costs are not incorporated into the baseline until approved.

- Interface with RFFO and Other K-H Projects – There is an RFFO counterpart to B707, who is actively involved in review of B707 progress. In addition, the B707 project coordinates with other K-H projects including identification of lessons learned. As noted, B707 is merging with B776/777, which will reinforce consistency and approach within these projects to more effectively reach closure within cost and schedule.

  Again, although RFFO is actively coordinating with B707, this coordination is mainly technical. Addition of Project Controls personnel in RFFO would provide the necessary on-board review and understanding of B707 schedule progress, which will become especially important with the merger of B707 and B776/777.

  Also, RFFO and K-H formal guidelines or procedures for their respective internal and external project interface and integration would be useful additions. See Observation ABC-11, Section 3.2.4 and its associated recommendations.

## *3.4 B771/774 Closure Project (Project C)(Cost and Schedule Details)*

The discussion of the scope, and the activities and approach to the work for Projects A, B, and C, are discussed collectively in Section 3.2 since many of the issues associated with these three projects are the same. The Cost and Schedule discussions for this project are included in this section.

### 3.4.1 Statement of Work

See Section 3.2

### 3.4.2 Activities and Work Approach

See Section 3.2

### 3.4.3 Cost Estimate: Process, Procedures/Details (Project C)

#### 3.4.3.1 Cost Methodology (Project C)

Approximately 100 different areas or sets of work are defined in PBD "C". A significant amount of time has been expended in the characterization of materials and inventories necessary to perform accurate cost and schedule estimates. Acting independently of the other areas, PBD "C" developed detailed quantity takeoffs and cost estimates. The cost estimates were the most detailed of all the PBD groups. Specific preps and cuts for each and every piece of equipment, piping, & materials were estimated using onsite unit pricing and man-hours that were specifically created in this group mostly from the D&D experience of Building 779. Most level of effort and support costs have been reused from the original K-H contract. These cost estimate details provided the information used to develop the current baseline cost. Actual man-hours expended from the D&D of Building 779 D&D crews/teams were utilized to derive the final baseline costs for Buildings 771 & 774. The *Facility Decommissioning Cost Model* (FDCM) was not used as published in PBD "C" baseline. Rather than taking the square footage unit prices or the linear foot D&D pricing from the FDCM, Building 771/774 went a step further by utilizing the D&D crews/teams that performed the remediation of Building 779 and establishing their own detailed database that supports a very low-level construction estimate/schedule. This is a very much more detailed approach and provides much more information and accurate cost as well as schedule information. None of the D&D costs were estimated using D&D crews and/or costs per volume or square footage of area. Factors were well applied to the cost of labor to account for miscellaneous equipment, material, and supplies for all D&D work. These factors are applied to detailed cost estimates and cannot be compared to other factors used in the other PBD areas each of which used their own factors for productivity.

#### 3.4.3.2 Cost Review (Project C)

PBD "C" has some of the lowest percent costs for program management, facility management, and Decommissioning Costs as shown in Table 3.3-1 (repeated below for

ease of use). The percentages are 3%, 18%, and 39% respectively as compared to the averages of 8%, 20%, and 49% (*which includes PBD "C" in the average of the 4 D&D areas). The 3% for program management appears low when compared to area "D"s 15% and area "B"s 11%. Similarly 39% decommissioning appears low when compared to areas "A", "B", & "D" of 48%, 60%, & 50% respectively. Some of these percent cost differences are due to the inconsistencies created by each area acting independently of each other in the manner in which they created their cost breakdowns including how they used subcontract services and professional services. Hours for professional services can be allocated in a particular PBD or they can be accounted for with dollars depending how they want to do the work. Tremendous amounts of flexibility have been built into the baseline and into each PBD cost accounts.

The Building 771/774 group has the best D&D cost estimates of all the PBD groups and integrates the cost details to the schedule in detail as well. If all the cost estimates were prepared in such detail the project would be better off. Since Building 771 is furthest along in their remediation efforts, the high level of effort and detailed cost preparations will benefit the entire project because they will be able to get accurate and meaningful productivity feedback as well as unit price estimates vs. actual costs in detail.

**Table 3.3-1, PBD A to D PM, FM, D&D % of Totals**
**(Repeated here for ease of use)**

| | PBD A | | PBD B | | PBD C | | PBD D | | PBD A-D TOTALS | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $, M | % of Total | $, M | % of Total | $, M | % of Total | $, M | % of Total | $, M | % of Total |
| **Program Management** | 14 | 4 | 28 | 11 | 6 | 3 | 39 | 15 | 87 | 8 |
| **Facilities Management** | 76 | 21 | 49 | 18 | 41 | 18 | 58 | 22 | 224 | 20 |
| **Deactivation/ Decommission** | 23<br>176 | 6<br>48 | 15<br>159 | 6<br>60 | 15<br>89 | 7<br>39 | 3<br>134 | 1<br>50 | 56<br>558 | 5<br>49 |

### 3.4.4 Schedule

Project schedules were reviewed with the PBD C, B771/774 K-H Project Controls team. The B771 project is the most advanced in completion against closure targets. Lessons learned from B771 are therefore important and being communicated to the other projects. The following areas were discussed and evaluated:

- Project Organization – The B771 Project is similar to the other B700 projects. The organization is comprised of a closure project manager, environmental compliance manager, project planning and controls including a work authorization group, and EESH&Q.

- Cost Estimate Basis for Authorizing and Budgeting Project Activities – The cost estimate was primarily based on using data in the Revision 3A Baseline estimate from the previous contract and adjusting it for revised scope under the new contract. In addition, cost estimates were developed for new scope activities based on sets and areas, implementing specific rates based on interviews with people experienced with the processes and historical data.

  The B771 project appears to have the best bases of estimate of all the projects. They also provided a complete re-estimate for the B371/374 project, and as a result, that project also has a good estimating basis. This data should now be applied to all the K-H projects so that the best possible cost estimates are in place for the entire project, which can be effectively resourced against P3 schedules.

- Cost Account Plans – There are 6 cost accounts including project management, surveillance & maintenance, deactivation, decommissioning, and project support, each with a cost account manager responsible for budgeting and reporting earned value against activities. Level of effort activities, which earn value equal to scheduled work budget, are statused by the central Planning and Integration group, who are responsible for the overall project schedule and evaluation of data from each K-H project. Detailed activities were developed at lower levels by module below the project schedule level. These activities are statused weekly and roll up to provide status input to the project schedule including pre-determined work activities and the monthly report. Pre-determined work activities represent deliverable work and are used as the basis for determining fee. The majority do not earn full value until completed. Separate reports were reviewed for the pre-determined work activities and were found to be consistent with established guidelines.

  Status of the detailed activities are reviewed internally on a weekly basis including problem areas and suggested workarounds as well as externally at the end of the month. Workarounds include the effective use of off-line recovery plans.

- Variance Reporting - Variances are recorded similar to other projects and provide input to the monthly progress report for discussion between K-H and RFFO.

- Changes (REAs) – Requests for Equitable Adjustments (REAs) are scheduled and estimated off-line within the K-H Planning and Integration System consistent with established guidelines. These activities and costs are not incorporated into the baseline until approved. Current REAs within B771 include input to WIPP WAC and the current issue regarding metals recycling.

- Interface with RFFO and Other K-H Projects – There is an RFFO counterpart, who actively participates in the B771 project. Also, the B771 Project supports other K-H projects, interfacing their experiences with them as well as transfer of lessons learned. This is especially important because of the advanced status of B771.

  Again, although RFFO is actively coordinating with B771, this coordination is mainly technical. Project Controls personnel in RFFO would provide the necessary on-board review and understanding of schedule progress.

Also, RFFO and K-H formal guidelines or procedures for their respective internal and external project interface and integration would be useful additions. See Observation ABC-11, Section 3.2.4 and its associated recommendations.

## *3.5 B776/777 Closure Project (Project D)*

### 3.5.1 Statement of Work

This Closure Project addresses the SNM removal and deactivation of the Buildings 776/777 and associated facilities; and decommissioning and demolition of the Buildings 776/777 and ten (10) associated facilities and eight (8) tanks. Buildings 776/777 performed manufacturing and assembling of special order and war reserve materials, operations involving site returns, waste operations and several development programs. These processes produced significant amounts of plutonium contaminated shavings and lubricants and secondary residues that were temporarily stored and sometimes recycled for reuse. No deactivation activities are scheduled beyond FY01. Decommissioning activities are now being performed that will remove existing contamination. The Project end state is demolition of the structures and subsurface concrete including building foundations.

The scope of work and associated costs for the B776/777 Closure Project to the cost account level are summarized below.

| • | **D** | **Building 776/777 Project** | **Cost, $x1000** |
|---|---|---|---|
| • | DA | Building 776/777 Project Closure | |
| • | DAA | Building 776/777 Project Management | $ 39,459 |
| • | DAB | Building 776/777 Building Operations | $ 57,993 |
| • | DAC | Building 776/777 SNM Removal Operations/Deactivation | $ 3,372 |
| • | DAD | Building 776/777 Decommissioning | $134,357 |
| • | DAE | Building 776/777 Material Stewardship | $ 19,816 |
| • | DAF | Building 776/777 Technologies | $ 13,917 |
| | **Project D Totals** | | **$268,913** |

Building 776/777 currently has quantities of Transuranic Waste, Transuranic Mixed Waste, Low Level Radioactive Waste, and Hazardous Waste to dispose of, in addition to waste material that will be generated during the demolition of the facilities and structures.

The closure of the B776/777 Complex requires:

1. All buildings, facilities and tanks in the complex are demolished.
2. All wastes are removed except for some materials that can be left in place, recycled or used as fill materials in accordance with regulatory requirements.

After decommissioning is completed, the ER Project (Project G) will be responsible for removal of under building contamination, and covering foundations, utilities or other remaining structures, paved roads and/or parking lots with a minimum of three feet of fill after final grade. The Closure Project Baseline (CPB) schedule date to complete the B776/777 Closure Project is October 27, 2006.

### 3.5.2 Activities and Approach

The merger of B707 and B776 is a positive step in consolidating work under one K-H lead. This will result in a more consistent basis not only for managing scope, but also cost and schedule including performance measurement.

The Building 776/777 Closure Project Decommissioning Operations Plan (DOP), November 3, 1999 includes a Critical Path as part of Set prioritization. The PBD Critical Path in the Closure Project Baseline presents a critical path that does not match that in the DOP. The DOP seems to be out of date in that regard and should be updated to eliminate inconsistencies.

**Observation D-1:** While the facilities strategy for Set prioritization is based on worker safety and a graded approach to perform increasingly difficult and hazardous work, a possible alternative strategy would be to consider moving Sets that require significant support from the final stages of dismantlement to earlier in the schedule. The *Set Completion Schedule by FY* has a number of Glovebox Sets, Equipment Sets, Tank Sets and Equipment/Room Sets that are planned for completion in FY05 (Sets 51, 60, 64, 66, 69, 80, and 83), FY04 (Sets 61, 63, 78, and 79), and FY03 (Sets 01, 04, 10, 31, 35, 36, 77, and 81). Contaminated equipment being dismantled so late in the Project requires maintaining high levels of radiological controls, use of health physics technicians, continued need for relatively expensive steel workers, and reduced efficiency while working in protective clothing. Also, with the earlier removal of plutonium contamination, the need for support systems such as nitrogen purge, UPS, fire support could be reduced.

> Recommendation: Develop and evaluate the implementation of the alternative strategy for early Set completion of all Sets involving contaminated gloveboxes, equipment, tanks, and associated piping without adversely affecting worker safety. In that way, the later stages of decontaminating remaining structures may be possible with a reduced need for radiological controls and its consequences.

**Observation D-2:** Recent safety occurrences in September and October 2000 involving cutting into live electrical lines have resulted in a heightened focus on safety. Management attention, revised safety procedures, more safety involvement on the worker level are some of the improvements. However, even with the recent heightened emphasis on safety, the aggressive approach to D&D could lead to lapses in safety and result in injury to workers and contract penalties and delays.

> Recommendation: Improvements in safety planning and work activities will require further direct involvement of dedicated Project safety personnel, heightened oversight by Project "H" safety professionals and RFFO to see that the recent safety improvements continue.

**Observation D-3:** The implementation of the replacement of the Remote Operated Size Reduction System (ROSRS) with decontamination and Surface Contaminated Object (SCO) characterization and packaging, Set 84 buried equipment removal and Set 82

building containment, have been scheduled. However, although risks associated with the uncertainties for these efforts may have been addressed in cost planning, the unknowns could affect both the logic and durations and therefore represent schedule risks.

Recommendation: Develop detailed planning of the potentially high risk activities early to ensure that these risks are bounded and acceptable.

### 3.5.3 Cost Estimate: Process, Procedures/Details

#### 3.5.3.1 Cost Methodology

84 distinctive sets of work have been developed to facilitate the D&D of Buildings 776 & 777. Roughly 5,000 man-hours have been expended in the characterization of materials and inventories necessary to perform accurate cost and schedule estimates. Independent of the other projects, PBD "D developed six types of sets defined: as Glovebox, Tank; Equipment; Room; Equipment/Room, and Building Structure Sets. These cost estimate details provided the information used to develop the current baseline cost. Actual man-hours expended from the D&D of Building 779 as well as feedback from onsite D&D crews/teams were utilized to derive the final baseline costs for Buildings 776 &777. The feedback from the onsite D&D activities have been assembled in the *Facility Decommissioning Cost Model* (FDCM). The FDCM was used to develop some of the costs in the PBD "D" baseline. The D&D costs were estimated using D&D crews and/or costs per volume or square footage of area. Costs were also estimated in a level of effort method based on historical on-site experience. A 15% factor was applied to the cost of labor to account for miscellaneous equipment, material, and supplies for all D&D work. Cost units used from the FDCM were factored down slightly using estimator's judgments to account for learning curves and repetition of tasks within each activity or set.

#### 3.5.3.2 Cost Review

PBD "D" percentage costs for Program Management, Facility Management, and Decommissioning Costs are shown in Table 3.3-1 that presents this data for PBDs A through D (repeated below for ease of use).

**Observation D-4:** A major observation is that the WBS divisions for deactivation and program management vary significantly from PBD "A", "B", & "C". Program Management is 15% of the total for PBD "D" which is double the average. Deactivation is 1% compared to a 5% average cost. These cost differences are due to the inconsistencies created by each area acting independently of each other in the manner in which they created their cost breakdowns through the use of sets and activities. Because these costs were developed through the use of square foot costs etc., they may not be as accurate as those costs developed by the Building 771/774 group.

Recommendation: The overall development of Buildings 776/777 has been prepared from the use of onsite parametric derived methods and provided an acceptable basis for the conceptual cost baseline. With the combining of the Building 707 and Buildings 776/777 Projects, it is recommended that this be

considered an opportunity to reduce the combined PM costs and become more consistent with the other Buildings Projects.

**Table 3.3-1, PBD A to D PM, FM, D&D % of Totals**
**(Repeated here for ease of use)**

| | PBD A | | PBD B | | PBD C | | PBD D | | PBD A-D TOTALS | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $, M | % of Total | $, M | % of Total | $, M | % of Total | $, M | % of Total | $, M | % of Total |
| **Program Management** | 14 | 4 | 28 | 11 | 6 | 3 | 39 | 15 | 87 | 8 |
| **Facilities Management** | 76 | 21 | 49 | 18 | 41 | 18 | 58 | 22 | 224 | 20 |
| **Deactivation/ Decommission** | 23<br>176 | 6<br>48 | 15<br>159 | 6<br>60 | 15<br>89 | 7<br>39 | 3<br>134 | 1<br>50 | 56<br>558 | 5<br>49 |

### 3.5.3.3 Other Cost Observations

The Estimate at Completion (EAC) is projected to be approximately $285 million for the Building 776/777 Closure Project, as reported in the 1st Quarter FY 2001, DOE, RFFO, Quarterly Oversight Report. This represents about a 7% increase over the baseline cost of about $266 million for the Project. From this review, it appears that the actual cost for the Project is not likely to exceed the current EAC, and could even meet, or be below, the baseline. The baseline cost estimate appears to be complete and reasonable to the extent that estimated costs may be somewhat conservative. With the aggressive management of the combined Building 707 and 776/777 Projects, the possible benefits of the lessons to be learned, and the inclusion of mitigated costs for high risk activities (such as the ROSRS, ITC, Set 84 below ground concreted equipment removal, and the Set 82 building outer containment), the cost variance is small enough that it is likely that it can be reduced or eliminated.

Completion of the Project on schedule depends on the size reduction and waste packaging provisions being available to support the Project. The ROSRS was deleted from the baseline and will be replaced by the addition of alternative size reduction technology. Also, major modifications were made to the Inner Tent Containment (ITC). Unless these modifications become available and function as planned, the scheduled completion of the Project is likely to be delayed.

The baseline development process for the Building 776/777 Closure Project includes data gathered in the Reconnaissance Level Characterization Report and other walk-downs. More than 31 Sets have been completed in this Project, plus the accomplishments to date in other the Buildings Projects could be used to develop unit costs for the types of activities performed to date. The cost estimate for this Project often uses parametric means in many cases, even where actual inventories, and characterization information is

available, and unit costs from recently completed activities, could be used to improve the CPB cost estimate.

The B776/777 Closure Project cost estimate of approximately $266.1 million includes only about $131.2 million for Decommissioning Cost Account (DAD). The Project Management, Building Operations, Deactivation, Material Stewardship and Technologies cost accounts comprise about half of the Project costs. The magnitude of the DAB cost account for Building Operations is the largest part of that cost and presents an opportunity for significant savings. The current plan to reduce and eliminate Building Operations (such as Safeguards and Security, Criticality controls, Surveillance and Maintenance, Fire Protection, nitrogen systems, Building Services, etc.) is not predicated on early closure of Building 776/777. It is not obvious however, whether an early closure plan if implemented, can be accomplished without adversely affecting Decommissioning costs and safety. Therefore, planning for prioritization of activities for the Building 776/777 Closure should evaluate accelerating the closing of Building Operations and include the overall effect on the Project schedule, cost, and safety.

**Observation D-5:** Cost Account DAB, Building Operations, is about 23 % of the total cost for Project D. In many respects the Building 776/777 Closure Project is similar to dismantling an operating facility rather than the other extreme of dismantling a cold and dark facility. The high cost of facility management of the 776 complex presents an opportunity to save significant cost by reducing/eliminating building operations activities as early as possible.

> Recommendation: Early reduction/elimination of building operations of the 776 complex should be evaluated to reduce operation costs without adversely affecting decommissioning progress, planning and safety.

The cost baseline for Project D could benefit by a more quantitative BOE that depends less on parametric costing. Also, staffing levels may be of higher level of skill and number than may be necessary.

About half of the $131.2 million for Decommissioning (Cost Account DAD) is for Set 82, Building Shell. The cost estimate for the Set 82 is about $67.4 million and includes a 33% contingency and escalation, which is reasonable for the stage of planning and the risks for this Set. The large cost for this Set and the use of parametrics in the cost estimate point to this Set as an opportunity for cost savings.

**Observation D-6:** Set 82, Activity ID 1DD8214000, Demolish B776/777 and Out Buildings, is estimated at approximately $24.2 million ($38.1 million with contingency and escalation). This cost is developed from the estimated area (225,000 sf) and the unit cost from the RISS Facility Decommissioning Cost Model (FDCM) Rev. 3a) for a type 3 facility with masonry structure (pg. D-20). The cost per square foot is about $107.56/sf ($24.50 + 0.75 x $110.75). Use of Rev. 0 of the FDCM, September 2000, would result in a unit cost of about $88.08/sf (pg. C-14, $15.40 + 0.75 x $96.90). Using Rev. 0 of the FDCM would reduce the cost for this Activity ID from approximately $38.1 million to $31.2 million.

Recommendation: The general use of parametric costing for Decommissioning in the CPB may be inappropriate at this stage of the Project. Resulting costs are basically order of magnitude with corresponding uncertainty. However, the cost for this Activity ID could be improved using the more detailed data and experience that is now be available for the Project.

**Observation D-7:** Overtime is planned at a level of about 26% of the total cost for craft labor. A reason for this high percentage of overtime is the planned Alternative Work Schedule with a twelve-hour work shift. The use of longer hours per shift can reduce the number of workers needed, and thereby tend to reduce congestion in the work areas. However, the possible benefit of the additional hours comes at the higher overtime rate, and a possible loss of efficiency because of greater fatigue near the end of the longer workday. The longer work-shift could also adversely affect safety because of the greater level of fatigue.

Recommendation: The use of a 12-hour shift should be reviewed against other multiple shift/overtime modes to see if the potential benefits are actually realized as a reduction in schedule at reasonable cost without sacrificing safety.

**Observation D-8:** An earlier issue of the PBD for the Building 776/777 Closure Project (10/20/99, pg. 4 of 38) indicates that decommissioning will generate about 1,100 $M^3$ of uncontaminated recycle metal. With the recent restriction by the DOE on the release of this material, the ultimate disposition and cost to dispose of this material could be significantly affected.

Recommendation: It is recommended that the estimated cost for disposition of the recycle metal be reviewed to see if it is consistent with the new DOE restrictions.

### 3.5.4 Schedule

Project schedules were reviewed with the PBD D, B776/777, K-H Project Controls team. The following areas were discussed and evaluated:

- Project Organization – The B776 Project as noted is merging with B707 under one K-H vice president. The organization is similar to the B707 Project and includes approximately 300 personnel.

  The merger of B776 with B707 is a positive step in consolidating work under one K-H lead. This will result in a more consistent basis not only for managing scope, but also cost and schedule including performance measurement.

- Cost Estimate Basis for Authorizing and Budgeting Project Activities – The cost estimate was again primarily based on using data in the Revision 3A Baseline estimate from the previous contract similar to the other projects and adjusting it for revised scope under the new contract. In addition, cost estimates were developed for new scope activities where information was available and the cost model was used on

a limited basis primarily for demolition, foundation and slab removal, asbestos abatement and pre-demolition surveys.

- Cost Account Plans – There are 6 cost accounts, each with a cost account manager responsible for budgeting and reporting earned value against activities. Level of effort activities, which earn value equal to scheduled work budget, are statused by the central Planning and Integration group, who are responsible for the overall project schedule and evaluation of data from each K-H project. Detailed activities were developed at lower levels by sets below the project schedule level and roll up to support that schedule. The scope basis was defined using ICWPs. Pre-determined work activities are included, representing deliverable work and are used as the basis for determining fee. The majority do not earn full value until completed. Separate reports were reviewed for these and were found to be consistent with established guidelines.
  These detailed schedules, which are in P3, are reviewed with Cost Account Managers weekly and discussed in detail once a month.

- Variance Reporting - Variances are recorded similar to other projects and provide input to the monthly progress report for discussion between K-H and RFFO.

- Interface with RFFO and Other K-H Projects – There is an RFFO counterpart to B776/777, who is closely following the progress of this project. In addition, the B776/777 project coordinates with other K-H projects. As noted, B776/777 is merging with B707, which will reinforce consistency and approach within these projects to more effectively reach closure within cost and schedule.

  Although RFFO is actively coordinating with B776/777, this effort is technical. Addition of Project Controls personnel in RFFO would provide the necessary on-board review and understanding of B776/777 schedule progress, which will become especially important with the merger of B707.

  Also, as previously noted, RFFO and K-H should develop formal guidelines or procedures for their respective internal and external project interface and integration.

## *3.6 Industrial D&D and Site Services Project (Project E)*

### 3.6.1 Statement of Work

The overall scope of this project encompasses landlord functions, stabilization, hazard removal, decontamination and decommissioning of all buildings on the site with the exception of those belonging to Projects A, B, C and D. The scope also includes decommissioning of facilities associated with Material Stewardship (Project F), providing site services to all site buildings with the exception of the nuclear buildings and construction work in sensitive areas of the RF Interim Closure Project such as the PuSPS in Building B371. The actual decontamination and decommissioning is performed by contractors to K-H based on K-H's building and facility characterization.

There are approximately 350 buildings and 400 other facilities (tanks, pads, vaults etc.) that have been divided into three geographic areas: the 400, 800 and 100/350/500/900 areas. Project E has identified only one Type 3 facility (Building 559, Analytical Lab) in its scope. Type 3 buildings require deactivation and decontamination. The rest of the buildings in the scope of this project are Type 1 and 2 buildings. Type 2 buildings generally require stabilization and decontamination, while Type 1 buildings generally only require demolition.

Five buildings have been identified as particularly significant due to past operations and the potential for finding additional areas of contamination:

- Building 444. The 11 Resource Conservation and Recovery Act (RCRA) Units in this building have been stabilized. Because of the varied operations carried out in this building as well as the accident history, there is a potential for encountering significant previously unknown contamination in and under this building.

- Buildings 865, 881 and 883: Varied operations were carried on in these buildings and there is a potential for encountering significant previously unknown contamination in and under these buildings.

- Building 886: At one time a critical mass laboratory was located in this building and due to the various operations that were conducted in this building over its lifetime there is potential for encountering significant previously unknown contamination in and under this building.

Project E has a total baseline budget of $735.4 million as of April 2001. The cost of this project is just below the combined cost of Projects B, C and D. The following four largest components of the cost comprise nearly 60% of the Project E costs:

- Cost Account EBE- Facilities Maintenance and Services ($78.9 M)
- Cost Account EDD 400 Area Decommissioning ($97.1 M)
- Cost Account EED 800 Area Decommissioning ($111.63 M)

- Cost Account EFD 100/300/500/900 Area Decommissioning ($124.1 M)

Landlord costs in Project E (Cost accounts EDB, EEB and EFB "Facilities Management") add up to 41 million dollars.

### 3.6.2 Activities and Approach

In the hierarchy of importance this project appears to rank low. Consequently, the activities in this project are limited by residual funding after funds are allocated to other projects. Originally for Fiscal Year 2001, decontamination and decommissioning was scheduled for Building 111 (office building), Building 333 (paint building) and Pad 132. Typical building problems include asbestos and paint containing PCBs that require off-site disposal. This occurred in Building 111 for which a contract was established in April 2001 and is scheduled for a September 2001 finish. The next set of buildings and facilities are scheduled for a 2004 decontamination start leaving 300 buildings and 400 other facilities and structures to be decontaminated and decommissioned in approximately two years.

**Observation E-1:** In the last two years of the project, approximately 300 buildings and 400 other structures need to be decontaminated and decommissioned. This may or may not be a realistic plan. The review team was unable to find or obtain any definitive plans that addressed the specifics of how this would be accomplished, nor were there any contingency plans should some of these building or structures be unexpectedly contaminated. One specific concern is whether sufficient personnel and resources can be brought to bear to accomplish these tasks in the allotted time frame at reasonable costs without endangering safety.

> Recommendation: The project should develop detailed definitive plans that include the resources needed, allowance for contingencies and options for decontamination and decommissioning of these buildings and structures by December 2006.

**Observation E-2:** Landlord activities continue for these large numbers of buildings until they are ready for decontamination and decommissioning in 2004 and beyond. The landlord costs do not contribute to the ultimate desired outcome to demolish the buildings. Since only one of the buildings is Type 3 and only a few others Type 2, a large number of buildings involved in this project can be demolished early in the project.

It was noted during the Burns and Roe second visit to the site in May 2001 (one month after the earlier visit in April), that K-H was cognizant of the fact that further strides need to be made in Project E to reduce landlord costs. Work has been accelerated in several buildings and it was stated that 50% of the loose property removal work in the beryllium contaminated Building 444 would be completed this year. The decontamination and decommissioning work in Building 444 was previously scheduled to start on November 7, 2002.

Recommendation: The project should conduct a study to optimize total project costs by prioritizing building demolition and evaluating optimum funding allocation to Project E.

### 3.6.2.1 Disposal of Contaminated Steel

Project E coordinates disposal of contaminated steel for the entire Rocky Flats site including nuclear Projects A, B, C and D. The plan documented in the Project Management Plan (PMP) for this project for disposal of steel, calls for recycling of the contaminated steel by the industry. DOE issued a moratorium on the shipping of steel six months back and recognizes this impediment to the project.

**Observation E-3:** Burns & Roe was advised that the total quantity of uncontaminated steel is expected to be 19,000 tons based on K-H estimates provided to Burns and Roe. Since it cannot be recycled, the costs of disposing this quantity of metal as Low-Level Waste (LLW) could be more than $100 million. These costs are not in the K-H baseline project costs and might become the basis of an equitable adjustment.

Recommendation: The disposal of this steel should be definitized and the costs associated with it should be formalized; by processing an REA if appropriate.

### 3.6.2.2 Seasonal Leakage of Groundwater

Approximately 150,000 gallons/year of seasonal leakage of ground water from Building 441 previously was sent to evaporators in Building 374. However, these evaporators are no longer operational. This groundwater is believed to be clean and K-H is awaiting confirmation of metals analyses to allow for direct discharge to the sewer. Seasonal leakage from other buildings may or may not be sufficiently uncontaminated to allow for direct discharge to the sewer. The baseline calls for treatment of this waste before release.

**Observation E-4:** The seasonal leaking of contaminated ground water along the building footprints and elsewhere (hitherto treated by processing through evaporators) is a generic issue that may exist even after closure since it is caused by hydrostatic pressures exerted by rainfall and snow. The effect of such leakages on the surface water quality is currently unknown.

Recommendation: Model in the actinide migration studies, seasonal discharges of ground water that might affect the quality of surface water.

### 3.6.2.3 Size Reduction of Metals

One of the areas of "high risk" identified in the Project E PMP deals with volume reduction of metals. The PMP states "The actual rate of plasma arc cutting that will be realized is not known for manual or remote operation". Also, an area of "medium risk" identified in the PMP states " Depth of contamination is inaccurate or poorly defined".

**Observation E-5:** There is adequate experience gained in the use of plasma arc in the 700 Buildings that can be directly or indirectly applied to Project E. Also, experience gained through limited decontamination and decommissioning activities completed to date could be useful input to update waste quantity estimates.

> Recommendation: Cross-pollinate ideas and experiences between the working staff on the 700 Buildings and staff on Project E (especially plasma arc cutting rates and waste quantity estimates).

As a positive observation, K-H sources have advised that experience gained in Beryllium handling in Beryllium contaminated Buildings 444 and 881 is being applied for Beryllium handling in the nuclear buildings. This should have very positive benefits.

### 3.6.3 Cost Estimate: Process/Procedures/Details

#### 3.6.3.1 Cost Methodology

236 buildings, 139 tanks, and numerous site wide tents, pads, and vaults will be demolished and decommissioned in Area "E". The Facility Decommissioning Cost Model (also referred to as the FDCM) was created mainly for the purpose of cost estimating Area "E". The FDCM was fully utilized in the baseline cost effort for the D&D costs of Area "E. All remaining costs have been estimated in a level of effort method based on historical on-site experience.

The model is fairly detailed and accounts for variations related to increased complexity of decommissioning from Type 1 to Type 3 buildings. The model incorporates decommissioning and cost experiences based on completion of D&D of Building 779. The model also incorporates adjustment factors for multilevel buildings and a learning curve to account for workers becoming more familiar and experienced with repetitive decommissioning related activities. Additionally, an excess property cost model was created from onsite experience to estimate the D&D of all items located inside Area "E" buildings and not included in the FDCM cost units.

#### 3.6.3.2 Cost Review

Copious details are listed for various line items indicating an extensive amount of effort was put into providing accurate cost accounting. Overtime, contingency, and escalation at 3.2%, 18.2%, and 5.9%, respectively appear reasonable for this task. Trade publications, historical data, cost models, commercial databases, and estimator experience are used to accomplish the cost-estimating task.

The RISS PMP dated August 31, 2000 indicates that there are estimated to be 630,840 items of excess property to be disposed. The items are not defined as to characteristics and could be as small as a staple puller to as large as a process glovebox. However, according to DOE staff at RFFO, these items have an acquisition value of more than $5,000 and include computers, as well as fire trucks, 50-ton presses, chillers, and other

real property. Some of these are sold as reusable items but many of the items remaining on the list will be disposed of as waste.

The estimator, listed as experienced in this work developed a cost model to use in the estimate. A total of 1.2 man-hours and approximately $24.61 in labor cost are used for each item of excess property. The cost model units are used in calculating the costs per building for disposing of the units contained in it, regardless of size. The quantity of units in a building ranges from as low as 200 to as high as 15,000. This cost model is unique to the project. Based on information provided by DOE regarding item characteristics, a total of 1.2 man-hours per item appears to be low. . The 630,840 total units indicated in the PMP will require 757,000 man-hours to disposition with a labor cost of approximately $15.5 million. Use of a higher man-hour unit can add several millions of dollars to the project cost, depending on the number of items yet to be disposed..

Regarding the contaminated steel concerns, K-H indicates that they will have some 19,000 tons of demolished contaminated steel categorized as low-level or mixed waste. Originally it was estimated that this would be recycled. Based on new DOE guidelines it must be disposed of at an approved waste site. The additional cost to the project is estimated by K-H to be around $ 100 million. A check of the cost to package, transport, and dispose of this quantity of steel ranges from approximately $85 to 235 million, depending on the ratio of low-level to mixed waste steel.

Overall the baseline cost estimate for Area "E" has been prepared using an onsite historical parametric methodology. Considering the unique nature as well as the large quantity of work that is to be performed, the estimated cost should be adequate to perform the work.

### 3.6.4 Schedule

Schedule discussions were not held with the PBD E. However, this project also has separate cost accounts and schedules similar to the other projects.

Recommendations are the same as recommendations for the other projects that both RFFO and K-H develop formal guidelines covering both internal and external interfaces as well as integration with the other projects and the total program.

## *3.7 Material Stewardship (Project F)*

Material Stewardship deals with the disposition of the Rock Flats Facilities and their contents. The material that comprises the structures, equipment and commodities is grouped into categories for movement to an appropriate offsite facility or disposal site. The categories are:

- Free released (non-contaminated) debris and material
- Low Level Radioactive Waste
- Low Level Mixed Waste
- Transuranic (TRU) Waste
- Transuranic (TRU) Mixed Waste
- Special Nuclear Material (SNM) (Includes Pu parts, classified and unclassified metal, unclassified oxide and Highly Enriched Uranium)
- Hazardous Waste
- TSCA waste (e.g. PCBs)
- Asbestos Containing Material (ACM)

The Material Stewardship Project covers the collection, characterization, and storage of all this material as it is generated during the decommissioning of the Rocky Flats Site. It also includes the transportation and disposal of material designated as waste, and the transportation and disposition of material (e.g. SNM) designated for storage in anticipation of some future use.

The general work scope performed by the Material Stewardship Project includes:

- Packaging and shipping of SNM and waste materials
- Characterization of SNM and waste materials
- Storage of SNM and waste materials
- Nuclear material control and accountability
- Safeguards and security
- Commodities and engineered services procurement and warehousing
- Traffic and transportation

Project F has a total baseline budget of $945.5 million as of April 2001. The cost of this project is about 90 % of the combined cost of Projects A, B, C and D. The following four largest components of the cost comprise about 60% of the Project F costs:

- Cost Account FAB Environmental, Safety, Health and Quality ($74.3 M)
- Cost account FBB Waste Facility Management ($75.8 M)
- Cost Account FBC Waste Programs and Operations ($358.5 M)
- Cost Account FCC Measurements ($79.6 M)

### 3.7.2 Activities and Approach

#### 3.7.2.1 High Waste Volumes Handled in Last Two Years

Based on the current schedule, in the last two years of the project, approximately 300 buildings and 400 other structures need to be decontaminated and decommissioned. Clearly, this is an ambitious undertaking. As we have observed before in Section 3.6, strategic planning is needed with respect to personnel and resources required to accomplish these tasks in the allotted time frame. The project envisages improvements in road facilities to handle a large traffic volume of transportation trucks during the last two years of the project. Another important issue that merits consideration is that the public and political aspects of the increased waste transportation by trucks as the shipping becomes more visible.

Figure 3.7-1 shows the quantity of low level wastes shipped per year over the project life. Figure 3.7.2 depicts the relative impact of rail versus truck transport during the project.

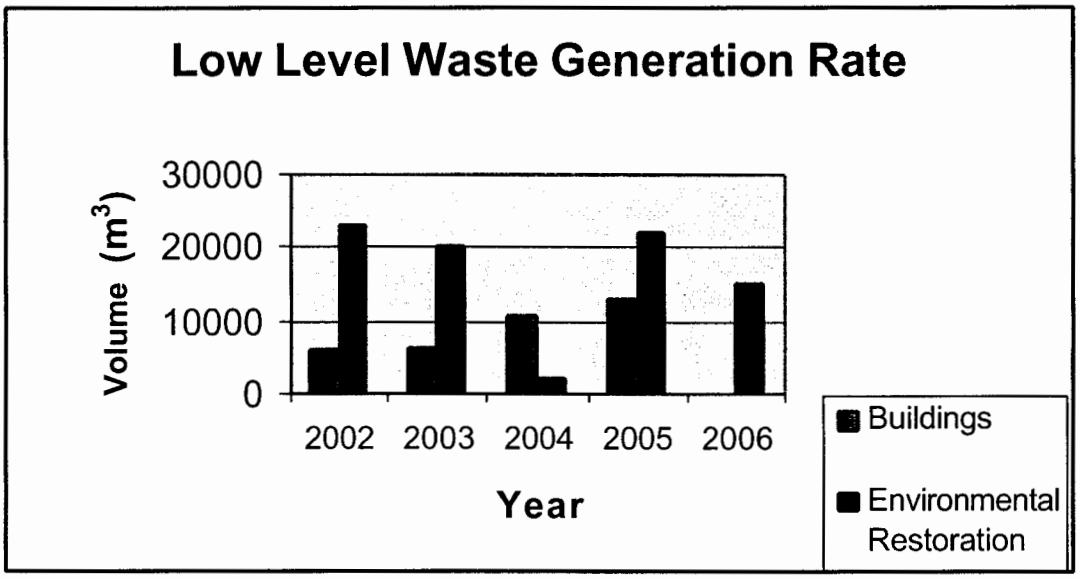


**Figure 3.7- 1 Low Level Waste Generation Rate**

**Observation F-1:** Alternative transportation needs should be evaluated to reduce probable congestion issues affecting project schedules and costs. Rail transportation of Low Level Waste (LLW) and Low Level Mixed Waste (LLM) is a segment of the material disposal that seems attractive for such an evaluation. Railroad transportation of these wastes is less expensive than transport by trucks. Also, it improves health, safety and environmental issues. A dedicated train could transport the same amount of waste as 240 trucks. Statistically, the possibility of a transport accident increases as the number of transportation events increase.

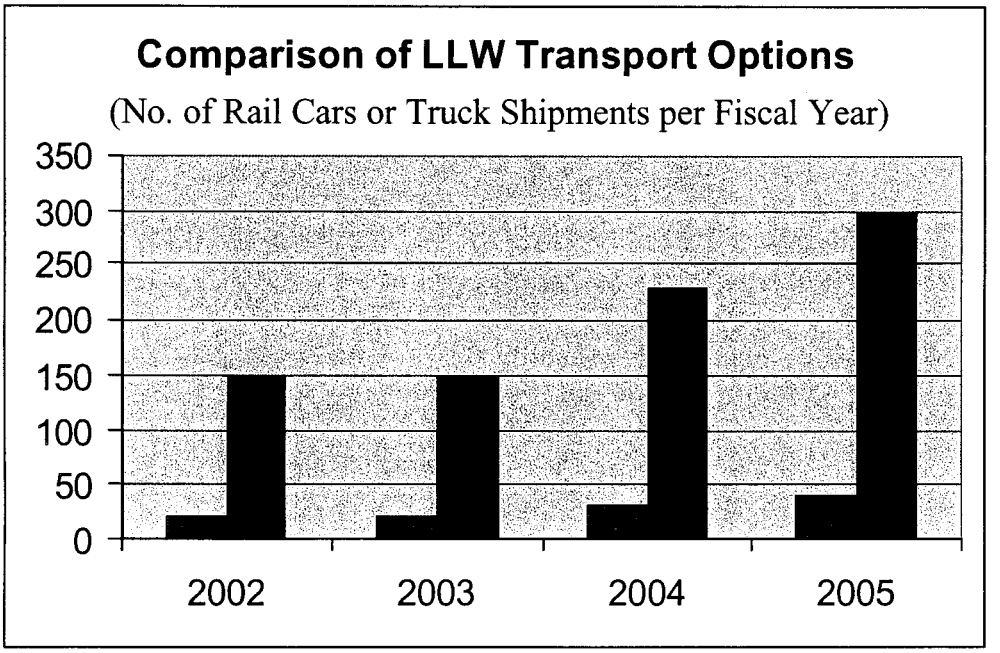


**Figure 3.7- 2 Comparison of LLW Transport Options**

It is noted that the project already has plans to use railcars for transportation of TRU Waste starting in FY03.

Rail tracks along the West access Road travels in northern direction towards the protected area stopping at approximately Sage Avenue. One of the spurs was interrupted due to construction of the buildings to handle loading of TRU containers into TRUPACT II. The project should evaluate an installation of railroad bypass around the TRUPACT II loading buildings as well as new track to facilitate point of generation loading into gondola cars from the protected area buildings.

Rail shipments to Envirocare have no restrictions. Ninety percent of the waste volume arriving there is shipped by railroad. Envirocare has all the necessary equipment and infrastructure to handle shipment of non-containerized bulk LLW. Shipments of non-containerized LLW and LLM at Envirocare is an advantage that is not available at the Nevada Test Site (NTS). NTS requires an intermodal transfer from railroad to truck system. Improvements in the infrastructure would be necessary to allow safe intermodal transfer of wastes for shipment to the NTS Site.

> Recommendation: Consider the environmental, safety, cost and schedule benefits of rail versus truck transportation of LLW, given the increase in truck transportation activity based on the significant material stewardship activity compacted in last two years of the closeout of the project.

### 3.7.2.2 Bulk Survey for Release

**Observation F-2:** A significant efficiency can be achieved by employing a radiological survey approach called "Bulk Survey for Release". This process involves the survey of large quantities of material after it is already packaged within a container.

Bulk survey uses statistical/probabilistic methods to developed measurement of the activity of bulk volume of waste loaded in a large volume such as a gondola car by selectively measuring activity of selected radionuclides. Thus, measurements of the required activity parameters of the bulk LLW and LLM wastes can considerably reduce the effort required for reclassification of potentially contaminated waste.

At least one company can "survey for release" very large containers up to an entire gondola car. One vendor will take title of the waste and ship to their facility where they will survey it again and dispose of the material themselves.

> Recommendation: KH/RFFO evaluate possible use of the bulk survey for release of waste for disposal especially when considering large volume shipments.

### 3.7.2.3 Alternate Disposal Options

**Observation F-3:** Industry is continually presenting innovative approaches to address waste processing, transportation and disposal issues. Among these developments are new disposal options.

US Ecology is one company that will decontaminate surface contaminated metal and other solid waste and (through a "survey and release" program) recycle most metals and other solid waste materials or landfill as non-radioactive material. (There is currently a moratorium on recycle within the DOE complex.) Under some circumstances US Ecology will take title to the waste thereby assuming long-term liability.

Waste Control Specialists operates a facility in West Texas for the processing, treatment and storage of hazardous, toxic and low-level and mixed radioactive wastes, and for the disposal of hazardous and toxic and certain types of low-level and mixed radioactive wastes. Waste Control Specialists is seeking additional regulatory authorizations to expand its treatment and disposal capabilities for low-level and mixed radioactive wastes.

Waste processing, packaging, transportation and disposal are industry areas that advance daily. Disposal costs have historically been very high due to limited or no competition. This has been changing and project planning needs to adjust to the market.

> Recommendation: Stay current with evolving waste processing, packaging, transportation and disposal developments and incorporate into project planning where justified.

### 3.7.2.4 Waste Generation Volumes

One of the factors considered in the Risk Analysis (Reference 3.7-1) is related to generation of accurate waste volume forecasts. As pointed out in Sections 3.7.1 and 3.7.2,

the waste generation volumes also affect the containers required as well as, characterization and transportation needs.

**Observation F-4:** Project E that handles all the uncontaminated steel for the entire RF Closure Project has identified 19,000 tons of uncontaminated steel that based on DOE moratorium cannot be recycled. (See Observation E-3). Even though the costs for the disposal of this steel will appear under Project E, the shipment of this material will be undertaken by Project F.

> Recommendation: Decontamination and Decommissioning of Building 771 is at an advanced stage and experience gained from the continuing operations should be used as a feedback to maintain an accurate forecast of waste volumes anticipated.
>
> Also, include the quantities of uncontaminated steel that need to be disposed of as LLW or LLM. Determine the impact of these additional volumes on packaging and shipping containers, characterization and transportation needs.

The waste volumes below grade are under the purview of the Environmental Restoration (ER) Project G. Project G, is responsible for cleanup of all the soil on the site. K-H liability below ground is limited to processing the volumes of various wastes not to exceed the following limits as provided in the K-H contract:

- Non-Rad Waste: 11,000 cu yds.
- Low Level waste 107,000 cu yds.
- Low Level Mixed Waste <1 nanoCurie: 41,000 cu yds.
- Low Level Mixed Waste >1 nanoCurie: 220 cu yds.

**Observation F-5:** While K-H liability is limited to the above listed volumes, the project runs the risk of having to handle large volumes should the contamination below the Buildings exceed the assumed levels. Currently Under Building Contamination (UBC) around the perimeter of three buildings with past history of spills/accidents have been measured. No surprises were discovered.

RFFO/KH stated that the soil final cleanup levels are likely to be revised to a lower level (See Observation G-3). This enhancement of soil cleanup levels will increase the volumes of contaminated soils well above the quantities listed above and listed in the K-H contract. RFFO/K-H believes a cost increase of up to $40 million may be needed to handle the additional volumes of contaminated soil. This further supports the earlier recommendation to ensure that bulk rail shipments are possible.

The Original Landfill is planned to be capped. The baseline estimate assumed that the slopes around the landfill were stable. It has turned out that the steep soil buttress may not lend stability to the cap. Burns and Roe was advised (Reference 3.7-2) that this element would entail removal 75,000 yards of contaminated soil. If this waste constitutes low-level mixed waste, disposal of the waste would result in an additional cost of $175 million. (Observation G-11). The additional volumes of contaminated soil that may be remediated should be factored into the project schedules and cost.

Recommendation: Investigation of the under building contamination should be expedited to confirm the waste volumes to be handled under ER Project G.

#### 3.7.2.5 Orphan Wastes

**Observation F-6:** Project F assumed that the treatment and disposal of orphan wastes will be provided by DOE. From the consideration of the closure project schedule, the existing and anticipated orphan wastes, their characterization and quantities should be identified in the GFS/I interface. Since their characterization and treatment will probably not satisfy project schedule needs, DOE, RFFO and K-H should develop packaging and transportation plans for untreated orphan wastes to another DOE site before the closure date of 2006.

Recommendation: Since it is questionable whether characterization and treatment of orphan wastes would be developed in a timely manner, DOE, RFFO and K-H should consider alternative packaging and transportation plans for moving untreated orphan wastes to another DOE site before the closure date of 2006.

### 3.7.3 Cost Estimate: Process/Procedures/Details

#### 3.7.3.1 Cost Methodology

Independent of the other areas, PBD "F" assembled their own cost estimate. The cost estimate details were prepared in accordance with the guidelines established in the K-H Cost Engineering and Cost Estimating Manual. Unit costs, wage rates, and productivity used in the estimate were adjusted for the specific conditions and quantities evaluated for the scope of work. A large portion of this area was developed through the use of level-of-effort activities. Activities involving materials, containers, and supplies needed to perform the work scope have been costed using available onsite cost data based on real either ongoing work (quotes & actual costs) or historical onsite experience onsite.

#### 3.7.3.2 Cost Review

Overall the baseline cost estimate for Area "F" has been prepared using an onsite historical parametric methodology. Considering the unique nature as well as the large quantity of work that is to be performed, the estimated cost should be adequate to perform the work as stated based on the current volume of wastes. However, added volumes based on different soil cleanup levels or other changes (see Observation F-5 above) could affect this. Both the detailed cost estimates and the level of effort costs appear to be reasonable and sufficiently detailed for a conceptual cost estimate for Area "F".

### 3.7.4 Schedule

Project schedules were reviewed with K-H Project Controls personnel from PBD F, the Material Stewardship Project. This project includes activities, which collect and account for materials from the other projects including B371/374, which are on the project critical path through respective material stewardship activities and environmental restoration to interim closure on 12/15/06. Discussions included the following:

- Project Organization – A Vice-President heads the Material Stewardship Project with technical areas reporting to him including waste management, SNM and support including Project Controls.

- Cost Estimate Basis for Authorizing and Budgeting Project Activities – The cost estimate is primarily based on using data in the Revision 3A Baseline estimate from the previous contract and adjusting it for revised scope under the new contract. In addition, cost estimates were developed for new scope activities.

- Cost Account Plans – There are 13 cost accounts, each with a cost account manager responsible for budgeting and reporting earned value against activities. Level of effort activities, which earn value equal to scheduled work budget, are statused by the central Planning and Integration group, who are responsible for the overall project schedule and evaluation of data from each K-H project. Critical activities are currently those, which interface with B371/374 activities and GFS/I. Pre-determined work activities represent deliverable work and are used as the basis for determining fee as done on the other K-H projects. These do not earn full value until completed. Separate reports were reviewed for the pre-determined work activities and were found to be consistent with established guidelines.

  The material stewardship project is currently in the process of rebaselining activities, including those that interface with TRU waste activities in the B371/374 Project. Plans are to complete input by June 1, 2001 and update the baseline by August 1,2001.

- GFS/I Interface – There are major interfaces between the material stewardship project and GFS/I activities, which are currently being reviewed by K-H and EM-33 including the need/availability schedule of the "9975" containers. K-H has identified need dates, which in some cases, are earlier than dates when GFS/I can be provided. These problem areas represent negative total float situations that are being evaluated and resolved between the material stewardship project and EM-33.

  Because Material Stewardship includes activities critical to project completion, it is recommended that this effort be accelerated for completion by July 1, 2001 or sooner so that necessary baseline updates can be incorporated into the project schedule along with all GFS/I activity relationships. These relationships should be established by either direct ties from GFS/I activities to K-H activities or by constraint milestones in the K-H project schedule to the K-H activities. This will result in an Integrated Project Schedule, which does not exist today.

- Variance Reporting – Variances are recorded similar to other projects and provide input to the monthly progress report for discussion between K-H and RFFO.

- EESH&Q Interface – PBD H (EESH&Q) provides an interface function to the material stewardship project. EESH&Q personnel are assigned directly to and charge the project as well as provide environmental and regulatory requirements input from PBD H. There is also a direct relationship with RFFO EESH&Q for reviews required within material stewardship. However, the K-H material stewardship project controls group noted that DOE has established reviews beyond those originally planned, which could potentially result in scope changes.

- Changes (REAs) – Requests for Equitable Adjustments (REAs) are scheduled and estimated off-line within the K-H Planning and Integration System consistent with established guidelines. The major REA issued was WIPP WAC, which was developed by the K-H material stewardship project. It was noted that no mitigation strategies were shown because it was not a contract requirement.

- Interface with RFFO and Other K-H Projects – The material stewardship project does interface with RFFO. However, these interfaces can often involve 9 or more RFFO personnel, and do not usually resolve problems. The material stewardship project also interfaces with other K-H projects. There is a regular process for interfacing with the other K-H projects, but the full scope of material stewardship is not well known within those projects. However, by August 2001, liaisons from material stewardship will interface directly with the other projects under their budgets to improve the process.

  Project Control personnel interface from RFFO with Material Stewardship is essential to project success. These activities are critical and require an on-board understanding of specific project schedule and cost issues to facilitate a more pro-active and timely approach to problem resolution. Also, RFFO guidelines or procedures should be established for effective and consistent RFFO interface with K-H.

  There are no formal guidelines for K-H to interface and document actions between other K-H projects. This would provide a more consistent basis for each project to function within the framework of the overall project schedule and would serve as the vehicle for each project to see what was happening in the other projects and benefit from lessons learned. This is especially important recognizing the critical interfaces from each project to material stewardship.

## *3.8 Environmental Remediation (ER) Project (Project G)*

### 3.8.1 Statement of Work

The ER program is divided into two zones: Buffer Zone (BZ) and Industrial Area (IA) activities. The ER scope for the Closure Project includes characterization and remediation of all remaining Individual Hazardous Substance Sites (IHSSs), Under Building Contamination (UBC) and Potential Areas of Concern (PACs) as delineated in the Rocky Flats Cleanup Agreement (RFCA). The scope also includes documentation where "No Further Action" (NFA) is required based on decisions documented in the following that are approved by DOE and the appropriate regulating agencies:

- Closeout Reports for the appropriate Remedial Actions
- Interim Proposed Plan and Corrective Action Decision/Record of Decision (CAD/ROD) that will define land use and cleanup levels
- Administrative Record for the appropriate areas and actions.

The remediation is governed by the RFCA (RCRA & CERCLA[1]) and involves development of Environmental Remediation Action Tracking List (release sites point and area), Sampling and Analysis Plan (SAP) for Industrial Area and Buffer Zone, ER Standard Operating Procedures (SOP) and miscellaneous decontamination and decommissioning. The SAP is provided to the Lead Regulating Agency. The Sampling Analysis Plans are general documents containing all but the site-specific sampling and analyses that are added as an addendum for each site. The same approach is to be adopted for the Health and Safety Plans. Specific SAPs for the individual sites are scheduled to be developed for each site to be remediated.

Field sampling and analysis and lab analysis of individual sites provides the characterization identifying the type, quantity, condition and location of radioactive and hazardous materials present at the site. A Decision Document is prepared identifying the need for remedial actions or no further action. Should remedial action be required the document also outlines the approach and applicable requirements that will be used.

Project G has a total baseline budget of $296.4 million as of April 2001 comprised of the following elements:

- Cost Account GAA- Project Management ($7.6 M)
- Cost Account GAB – Buffer Zone ($70.85 M)
- Cost Account GAC- Industrial Area ($217.9 M)

### 3.8.2 Activities and Approach

Sampling is random, preferential and real time geostatistical, and some sample compositing is used to lower costs. In addition to the characterization achieved through

[1] Comprehensive Environmental Responsibility, Compensation, and Liability Act of 1981 (CERCLA)

sampling and laboratory analyses field sampling and analysis is used during remedial activities to guide the clean up and determine its end point. Confirmatory samples are then taken and analyzed in the laboratory to assure the remedial criteria have been met.

The scope of each building PBD includes removing slabs on grade and foundations down to three feet below the final grade. However, should the building foundations be contaminated, the buildings' scope includes removing the contaminated concrete below 3 ft and its disposal. ER, Project G, scope includes cleanup of all the soil on the site. The K-H liability below ground is limited to processing the volumes of various wastes not to exceed the following limits as provided in the K-H contract:

- Non-Rad Waste: 11,000 cu yds.
- Low Level Waste: 107,000 cu yds.
- Low Level Mixed Waste <1 nanoCurie: 41,000 cu yds.
- Low Level Mixed Waste >1 nanoCurie: 220 cu yds.

K-H advised that only twenty percent of the seven miles of buried piping systems belonging to the old and the new process waste lines will be removed for decontamination and disposal. The remainder of the pipes will be drained and filled with foam to stabilize contamination. The volumes of the pipeline waste are included in the total volumes of waste listed above.

**Observation G-1:** Section 6.3 of the working draft of the RFCA Standard Operating Protocol for Soil Remediation shows that there are 7,400 ft of Old Process Waste Line (OPWL) and New Process Waste Line (NPWL) piping beneath buildings with basements. Clearly, these are inaccessible lengths of piping that will have contamination stabilized in place and the piping left in place.

> Recommendation: Provide identification and basis of the twenty percent of OPWL/NPWL piping to be removed, and justify non-removal of the 7,400 ft of piping beneath the basements.

**Observation G-2:** Section 6.3 of the working draft of the RFCA Standard Operating Protocol for Soil Remediation states "Sections of the pipelines that are stabilized in place will be subject to post-closure performance monitoring and institutional controls". Also, it states that "Groundwater monitoring at and around areas of stabilized pipeline will be performed under existing or modified IMP programs to monitor for any post-remedial action contaminant migration". Burns and Roe did not observe any systematic activities associated with specific groundwater monitoring at and around any buried and stabilized piping.

> Recommendation: Review ground water monitoring requirements for areas around stabilized pipelines, and ensure required monitoring is being performed.

### 3.8.2.1 Final Soil Cleanup Levels

Presently the remediation activities for the site soils are based on soil "Action Levels" defined in RFCA. Soils exceeding the Tier 1 action level are typically removed, while soils exceeding the Tier 2 level require a lesser action. Based on an assumed industrial area/open space land use, the levels for Tier 1 and Tier 2 action levels are 651 and 115 Pico Curies of Pu per gram of soil respectively.

Actinide migration studies are in progress and scheduled to be completed in FY 2001. The goals of the studies are outlined below from the FY 2001 activities report posted on the WEB site:

- Urgent: What are the important actinide migration sources and migration processes that account for recent surface water quality standard exceedances?
- Near-term: What will be the impacts of actinide migration on planned remedial actions? To what level do sources need to be cleaned up to protect surface water from exceeding action levels for actinides? What affect do the planned remedial actions have on actinide migration?
- Long-term: How will actinide migration affect surface water quality after Site closure (or what soil action levels will be sufficiently protective of surface water over the long-term)?
- Long-Term: What is the long-term actinide migration, and will it impact downstream areas (e.g. accumulation)?

Burns and Roe was advised during discussions of this subject that the chief concern is related to the windblown surface contamination eastwards from the 903 Pad. About seven acres of the area could have Pu activity above the expected threshold requirement.

**Observation G-3:** A study performed in February 2000 by an independent citizen's group, the Radionuclide Soil Action Level Oversight Panel, recommended a final soil cleanup level of 35 Pico Curies of Pu per gram of soil. RFCA, Appendix N, Table 6 also specifies preliminary risk based remediation goals (final soil cleanup levels) of 20 and 35 Pico Curies of Pu per gram of soil for office worker and open space respectively. RFFO believes that ultimately, the decision with respect to soil final cleanup levels may be based on considerations other than technical, and are likely to be substantially less than the current action levels. Based on the estimate of final soil cleanup level by RFFO and KH staff, this may result in an additional cost of up to 40 million dollars for the added soil removal needed to meet an enhanced soil cleanup level.

Unless the final soil cleanup levels are agreed to in a timely manner by all parties involved including the regulators and the stakeholders and included in the revised RFCA, the cost impacts could be substantially higher than currently projected. Schedule impacts could also be anticipated.

Recommendation: The soil final cleanup levels should be incorporated into RFCA in Calendar Year 2001 to facilitate effective site closure planning (and thereby minimize cost and schedule impacts).

**Observation G-4:** Should the final soil cleanup levels be made more restrictive, K-H is not planning to revisit sites for which remediation is deemed to be completed and a report for NFA was filed with the regulators. This approach entails risk.

Recommendation: As part of the process for establishing final cleanup requirements, address with regulators the potential impact of final cleanup requirements on already filed reports for NFA.

**Observation G-5:** The surface water quality is intimately linked with not only soil cleanup levels but also what is buried underground as well as the ground water that leaks to the surface (see Observation E-4, Section 3.6). However, it is our understanding that this issue will be addressed in the actinide migration study.

Recommendation: Ensure that the subject of seasonal ground water leakages is directly included in the actinide migration studies or is enveloped by the imposed boundary conditions in the studies.

### 3.8.2.2 Interaction with Regulators

The matrix provided by K-H shows that based on the past history of the project, they have determined that no actions are necessary in 124 IHSSs and 108 PAC's, for a total of 233 locations as shown in Table 3.1-1. However, about 40% of these have been approved with almost half of them still awaiting Regulator action.

More intriguing is the fact that the sites for which "No Action" was rejected, or for which additional data was requested, have a proposed date of NFA prior to 1999. There is probably a gap between K-H perception of "No Action" required for certain sites based on the acceptance criteria and the regulating agencies' interpretations thereof. Delay in bridging the gap is detrimental to the project costs and schedules.

**Observation G-6:** The differences between the positions taken by K-H and the regulating agencies with respect to "No Action" must be resolved in an expeditious manner. If remediation is required for some of the sites it should be recognized early to minimize schedule impacts.

Recommendation: K-H meet with the regulatory agencies such that they can understand, be sensitive to, and responsive to the regulatory agencies' requirements for declaring "No Action" at a given site.

The data provided by K-H to Burns and Roe regarding remedial action, see Table 3.8-1, also shows that only ~10% of the remediated sites have been approved by the Regulators for "No Further Action". 21 of the 28 locations were remediated in 1996, 2 in the early nineties, 1 in 1997, 2 in 1998 and 2 in 1999. But only 3 sites were approved, and these

were the ones remediated most recently. Of the remaining 25 remediated sites, the regulators have taken some action for 15 locations. But communication and approval for the 10 pending locations remediated earlier is held up for reasons that are not very clear to Burns and Roe. We were informed that the agency did sign the "close out reports" in some of these cases, and yet no final sign off of NFA was forthcoming. The fact that the locations that were remediated earlier are the ones not yet approved causes speculation whether the bases of acceptance have changed in the intervening years. The RFFO and K-H staff assured however, that there has been an improvement in communications with the regulators.

**Table 3.8-1 Status of Regulator Approvals, as of Jan. 24, 2001**

| Description of Locations ((IHSSs and PAC's)/Decision | No. of "No Action" Locations | No. of "No Further Action" Locations |
|---|---|---|
| | | |
| Total locations sought from Regulators | 233[1] | - |
| Total locations needing remedial action | - | 94[2] |
| Number of locations where remedial action completed, sought NFA approval | - | 28 |
| Number of locations approved by Regulators | 94 | 3 |
| Number of locations rejected by Regulators | 10 | 15 |
| Number of locations for which additional data was requested by Regulators | 20 | |
| Locations for which Regulators' decision is pending | 109[1] | 10 |

[1]Includes one UBC
[2]For which remedial action is needed

One of the entries (IHSS 142.4) in the Site Activity Tracking List for which NFA was determined by K-H but was rejected by the regulators states "Passed Colorado Department of Public Health and Environment (CDPHE) screen with pond and sediment data. CDPHE/EPA Letter 7/9/99- do not concur with NFA". There are several entries in the same table where it is claimed "passed CDPHE screen". Apparently, statements "passed CDPHE screen" do not assure acceptance by the regulating agencies.

Another entry Property Utilization and Disposal (PU&D) Storage Yard (IHSS N/A) for which No Action/No Further Action (NA/NFA) was proposed in 1998 has been rejected twice by the regulators in spite of additional data provided to them after the first rejection.

**Observation G-7:** Differences exist in the K-H understanding and the expectations of the regulators for a site to be declared NFA.

Recommendation: K-H/RFFO meet with the regulatory agencies to ensure they understand, can be sensitive to, and be responsive to the regulatory agencies' requirements for declaring a site NFA. Also, RFFO must assign a RFFO team the responsibility to coordinate and facilitate the efforts for timely approval of the NFA by the regulators.

**Observation G-8:** The ER process includes performing a risk assessment of existing conditions, and either filing (a) an RFI/RI, along with a recommendation for No Further Action, or (b) filing, and obtaining regulator approval of, proposed clean-up actions, and then filing a closeout report. For both of these scenarios, the regulators must then provide approval of No Further Actions. Identification and scheduling of final regulator approvals was not evident in the review of the PBD and schedules, nor was the lead responsible party.

Recommendation: Identify, schedule and assign lead responsibilities for activities required to secure regulator approval of No Further Actions.

### 3.8.2.3 Old Landfill and Pond Liners

The PBD makes several assumptions on this subject. One of them states "Engineered caps are an integral part of the Site's environmental closure strategy, and the regulatory agencies will agree to the use of evapo-transpiration caps".

**Observation G-9:** The above K-H assumption is based on work done at Sandia Labs and Rocky Mountain Arsenal sites in the US.

Recommendation: K-H/RFFO enter into an early dialogue with the regulators as to the acceptability of evapo-transpiration caps under conditions prevalent at the Rocky Flats site.

**Observation G-10:** The Original Landfill is planned to be capped. The baseline estimate assumed that the slopes around the landfill were stable. It has turned out that the steep soil buttress may not lend stability to the cap. Burns and Roe was advised that this element would entail removal of 75,000 yards of contaminated soil. If this waste constitutes low-level mixed waste, disposal of the waste would result in an additional cost of $175 million.

Recommendation: The costs associated with the disposal of contaminated soil in the Original Landfill should be formalized. Processing of an REA might be appropriate.

**Observation G-11:** It has not yet been determined if the pond liners can remain when the ponds are capped, and if this is not the case, then the liners will need to be removed and disposed off-site at an additional cost of $2 to 3 million.

Recommendation: The decision related to removal of pond liners should be made early. An REA may then be processed if removal of the pond liners is required.

### 3.8.3 Cost Estimate: Process/Procedures/Details

#### 3.8.3.1 Cost Methodology

Independent of the other areas, PBD "G" assembled their own cost estimate. The cost estimate details were prepared in accordance with the guidelines established in the K-H Cost Engineering and Cost Estimating Manual. Unit costs and rates for productivity used in the estimate were adjusted for the specific conditions and quantities evaluated for the scope of work. The Facility Decommissioning Cost Model (also referred to as the FDCM) was not used in the baseline cost estimate for Area "G". Unit costs used for the construction activities overall are reasonable. All the level of effort costs appear to be reasonable and sufficiently detailed for a conceptual cost estimate.

#### 3.8.3.2 Cost Review

Copious details are listed for various line items indicating an extensive amount of effort was put into providing accurate cost accounting. Trade publications, historical data, cost models, commercial databases, and estimator experience was used to accomplish the cost-estimating task. Overtime, contingency, and escalation at 10.5%, 26.8%, and 7.8%, respectively appear reasonable for this task. Units shown for civil work are generally average to high.

The original landfill was assumed and estimated capped in its current state. Recent data indicates that it will now require the removal and disposal of some 75,000 cubic yards of mixed waste material. K-H values this additional effort at $175 million. This calculates to $2,300 per cubic yard for removal, packaging, transportation and burial at the Envirocare site in Utah. Based on historical data for similar scope the cost per cubic yard appears reasonable.

### 3.8.4 Schedule

Separate discussions of schedule were not held with the K-H Environmental Remediation Project PBD G. However, the general schedule recommendations for PBD G include those recommended for other K-H projects. This also includes both RFFO and K-H developing formal guidelines or procedures that cover both internal and external interfaces and integration with the other projects as well as the total program.

The review did indicate that the schedule shows activities related to the Original Landfill capping even though the project does not intend to cap this areas for reasons of unstable support structure of this location (See section 2.8.2.3). None of the activities scheduled in FY 01 have been started.

**Observation G-12:** The final soil cleanup levels decision scheduled for implementation this year are not currently identified as an input and is therefore not factored into the schedule. This decision leading to determination of final soil cleanup levels will be based on several studies already completed as well as actinide migration studies currently underway and ultimately in consultation with the regulators and stakeholders.

Recommendation: Identify and track activities that will result in establishing final soil cleanup action levels in calendar year 2001.

**Observation G-13:** The project typically provides a window of three months following preparation of a decision document to allow for review by DOE, public and the Decision Document Agency. Subsequent to this review the remediation action is implemented and finally the close out report is written and approved by DOE. Approval of the closeout report by the regulators is not shown on the schedule. Additionally, KH indicated that if there is delay with respect to the window provided for DOE, public and regulator approval, KH would be entitled to equitable adjustment.

Recommendation: Based on earlier observations related to delays in obtaining approval of the regulating agency for "NFA" or "No Action" (OBS G-6 and 7), the project should include the effect of delays on project costs and schedules in Risk Assessment. Also, the responsibility for final approval of NFA (see Observation G-8) should be determined. If K-H is responsible, an activity related to this subject should be added to the K-H schedule.

## *3.9 Engineering, Environmental, Safety and Quality Programs (EES&QP) Project (Project H)*

### 3.9.1 Statement of Work

The EES&QP organization has been reorganized into two separate groups; (1) Environmental and (2) Safety, Engineering & Quality Programs (SE&QP). The change occurred during this review. The documents included in this review are all based on the EES&QP organization; therefore, the following discussion considers only the original EES&QP Project.

The EES&QP organization has responsibility for overall engineering, safety (including nuclear and criticality safety, and independent safety oversight) and occupational medicine, radiation protection, environmental stewardship, quality, and training programs that are required to close the Site. The scope of the EES&QP Project includes the programmatic infrastructure for all the Closure Projects and meets specified requirements in the K-H Contract. In some cases, direct requirements are specified for functions of the EES&QP. In other cases, the EES&QP Project has oversight responsibilities to ensure the requirements are met although the work will be performed in the Closure Projects.

The EES&QP Project consists of eleven (11) cost accounts as listed below.

| Cost Account | | Cost, $x1000 |
|---|---|---|
| HAA | Project Management | 9,651 |
| HAB | Safety | 29,127 |
| HAC | Independent Oversight and Quality Assurance | 23,071 |
| HAD | Environmental Media Management | 51,689 |
| HAE | Training | 18,378 |
| HAF | Nuclear Safety | 12,472 |
| HAG | Engineering | 12,218 |
| HAH | Analytical Laboratory Management and Integration | 22,157 |
| HAJ | Radiological Protection | 30,097 |
| HAK | Environmental Management and Compliance | 47,680 |
| HAL | Environmental Systems and Stewardship | 1,075 |
| | Project H Totals | 257,616 |

### 3.9.2 Activities and Approach

EES&QP provides general direction and oversight through the issuance of programmatic plans, documents, and manuals. They do not prepare or provide review of project elements or specific Health and Safety, Sampling and Analysis, Quality Assurance Project or Job Safety Analysis Plans. These are prepared by the individual Projects. The apparent separation between EES&QP and the Closure Projects has the potential to restrict flow of information in both directions. It is recognized that the operation of EES&QP may assume a more proactive role in preparing and reviewing these plans as

the Closure Project matures. Some of the following observations are directed to strengthening this area.

Discussions with DOE headquarters and RFFO about safety and health indicate that RFFO has line responsibility. DOE EM-33 provides direct oversight of RFFO through report reviews, site reviews/audits, and general communications, and indirectly of K-H through report reviews. Oversight of K-H is provided by the RFFO staff. The policies, requirements, integrated safety management (ISM), etc., used by EM-33 for review of DOE-RF are in the various DOE Orders and guidelines. EM-33 is not directly involved in K-H operations, i.e., corrective and preventive actions, trend monitoring, etc., rather this is RFFO's responsibility. EM-33 does, however, become involved by providing direction to DOE-RFFO.

An area of concern is the day-to-day RFFO oversight of K-H in the safety area. It is recognized that RFFO is sensitive to safety and is preparing direction for K-H to follow to promote interaction between RFFO, EESH&Q and the Closure Projects.

**Observation H-1:** The influence of EES&QP into the individual Projects could be more pro-active. There seems to be a disconnect between the guidance provided and the application of Safety and Quality concerns in the individual Projects.

> Recommendation: EES&QP participate directly in reviewing and approving related Project activities, and provide some field oversight. Safety policies, requirements and issues need to be communicated to all tiers.

**Observation H-2:** There needs to be a system of checks and balances to determine if EES&QP's guidance is being followed by the task groups and integrated into their various plans; these plans meet contractual requirements; and/or these plans meet the minimal regulatory requirements.

> Recommendation: As a minimum, EES&QP assign one appropriate individual to work directly with the task group for plan preparation of these plans, and EES&QP formally review and approve at least 10% of these plans.

**Observation H-3:** Additionally, it not clear if EES&QP provides field oversight during actual field operations, i.e., D&D, remediation, etc. to determine if policies, procedures and plans are being followed. Burns and Roe was informed that their efforts were graded based on the risk level but we saw no quantitative information.

> Recommendation: EES&QP develop and implement a plan to provide field oversight of operations.

**Observation H-4:** Burns and Roe was advised that reportable accidents trended up last year. However, we were unable to obtain specific accident rates, comparison of their accident rates with similar industry, or Workman's Comp ratings - items we believe should be closely tracked and managed by EES&QP.

Recommendation: EES&QP take a more proactive role in accident and safety violation prevention and their interactions with DOE in these areas. Specifically, it is recommended that EES&QP track and maintain accident rates, industry comparisons of rates, and Workman's Compensation ratings, and then use these data to strengthen their program.

**Observation H-5:** Burns and Roe determined that safety violations trended up last year, which could relate to the upward trend in reportable accidents. Reducing the number of reportable accidents and safety violations, which pose unacceptable risks to workers, and which can also result in lengthy shutdowns that interrupt cleanup activities, must be a high priority.

Recommendation: EES&QP track and maintain safety violation rates, and then use these data to strengthen their program.

**Observation H-6:** EES&QP has instituted an Accident Investigation Program. However, they do not have a Near-Miss Accident Investigation Program.

Recommendation: EES&QP develop and implement a Near-Miss Accident Prevention Plan.

**Observation H-7:** The RFETS Integrated Monitoring Plan (IMP) details the Site programs for water, air and ecology monitoring activities to be performed for legal, contractual and operational purposes. This document represents agreements with the EPA, Colorado, and localities on the requirements for the data to be collected. The IMP is noted not to have a document number, Revision number, date, or approval signoffs.

Recommendation: Control documents important to the Project in a manner to ensure that current revisions are being used and that the document has been approved and signed off for use.

### 3.9.3 Cost Estimate (Process, Procedures/Details)

#### 3.9.3.1 Cost Methodology

Area "H" baseline cost estimate was developed entirely from a level of effort cost methodology. Wage rates and subcontractor labor costs were extrapolated from onsite ongoing and historical experience. Manpower reductions are planned and are prepared in accordance with the guidelines established in the K-H Cost Engineering and Cost Estimating Manual. No D&D or construction costs are included in Area "H". No unit cost guidelines have been used or apply to this area. Each of individual areas either have costs included for their own EES&Q services or have allocated man-hours as necessary so that Area "H" can supply the services and include the costs as shared services. Significant experience from ongoing operations, safety, training, and quality assurance activities was used in the preparation of the baseline cost estimates.

The Estimate at Completion (EAC) is projected to be approximately $232.2 million for the EES&QP Project as reported in the 1st Quarter FY 2001, DOE, RFFO, Quarterly

Oversight Report. This represents about a 10% decrease in the baseline cost of about $257.6 million for the Project.

### 3.9.3.2 Cost Review

Area "H" is the only area that does not include any overtime. Overtime, contingency, and escalation of 0%, 12%, and 5%, respectively, appear reasonable for this task. The services provided should support a wide variety of work scopes from the other areas. As the project scopes of work become more defined through additional engineering, Area "H" should not have to modify or alter their costs. All of the level of effort support services and subcontracts appear to be reasonably calculated and applied in the baseline costs of Area "H".

**Observation H-8:** EES&QP costs are included in individual Projects as well as in Project H. Thus, the total staff engaged in EES&QP activities goes beyond the staff levels included in the Project. Current costs for EES&QP are below the budget. Unless additional staff is needed to provide recommended added direct involvement in oversight of plans and field activities, future spending is likely to remain under budget.

> Recommendation: Review the planned Project level of effort (LOE) in the cost baseline and match staffing plans with actual work products to be developed, and required support to be provided. It is possible that actual staffing requirements could be less than now planned.

As a positive observation with regard to the RFETS Groundwater Well Sampling, Monitoring and Analysis Costs: A comparison was made of yearly groundwater well sampling, monitoring and analysis costs for Rocky Flats ER to that in the Savannah River Site ER Program. The yearly cost of groundwater sampling, monitoring, analysis, modeling and reporting for the Rocky Flats ER was obtained by adding up costs associated with the WBS 0501, Monitoring, activities under Groundwater and Landfill, and GW Analysis Modeling and Reporting. This comparison found the Project costs for ground water sampling, monitoring, analysis and reporting to be in reasonable agreement with those at the SRS site.

From this review, it appears that the actual cost for the Project is not likely to exceed the baseline, and could remain about the level of the current EAC unless additional staff is added to the Project.

### 3.9.4 Schedule

Project schedules were reviewed with K-H Project Controls personnel from the PBD H, EESH&Q Program Project. This project provides an overview function to the other projects for engineering, environmental, safety and health including personnel matrixed into the other projects. It was further noted that the environmental function has now been separated from EESH&Q and operates on its own with a similar organization. In addition, K-H's Ken Powers now heads up safety, health and quality as well as

overseeing a new safety assessment center function for the entire program. Discussions included the following:

- Project Organization – The project includes industrial health, safety/radiation protection and technical programs as well as project controls support for each of these areas. The organization including environmental includes approximately 300 personnel including criticality engineers, who are EESH&Q personnel, but report to and are budgeted under the other projects.

- Cost Estimate Basis for Authorizing and Budgeting Project Activities – The cost estimate for Environmental and ESH&Q combined is level of effort with no external milestones.

- Cost Account Plans – There are 11 cost accounts including 3 environmental and 8 ESH&Q, each with a cost account manager. Since these are level of effort activities, earned values are statused by the central Planning and Integration group, who are responsible for the overall project schedule and evaluation of data from each K-H project. There are no pre-determined work activities for deliverables. Therefore, there are no detailed schedules below the project schedule level.

- Variance Reporting – There are only cost variances because activities are level of effort. These are recorded similar to other projects and provide input to the monthly progress report for discussion between K-H and RFFO.

- Environmental and ESH&Q Interface – These projects provide personnel to each K-H project as well as an overview function for the projects to insure that necessary environmental, regulatory and safety requirements are identified against respective activities within the projects. The main focus of ESH&Q is safety and a new safety assessment group is now in place to track safety issues. In addition, requirements lists have been generated for the individual projects showing required environmental and ESH&Q interfaces to their activities.

- Interface with RFFO and Other K-H Projects – The Environmental and ESH&Q projects interface on a monthly basis with other K-H projects and RFFO. However, this is mainly technical.

  Project Control personnel interface from RFFO would provide an on-board understanding of specific project schedule and cost issues within environmental and ESH&Q. This would facilitate a more pro-active and timely approach to problem resolution. Also, there should be more RFFO interface with these projects and guidelines or procedures established for effective and consistent interface with K-H.

  There are no formal guidelines for K-H to interface and document actions between other K-H projects. This would provide a more consistent basis for each project to function within the framework of the overall project schedule and would serve as the vehicle for each project to see what was happening in the other projects and benefit from lessons learned. This is especially important recognizing the interfaces from

each project to environmental and ESH&Q projects, which have the potential of being critical to other project activities and project closure.

## *3.10 Support Project*

### 3.10.1 Statement of Work

The Support Project (PBD J) includes support activities primarily for K-H Administration as well as the K-H Executive Office, General Counsel and Audit, and Strategic Planning & Integration.

There are nine (9) Cost Accounts under the Support Project, the majority of which include level-of-effort activities and estimated costs for this scope. There are other cost accounts however, that vary based on adjustments required between actual indirect cost rates and estimated indirect cost rates. Because of this, estimated totals have not been shown here for PBD J.

- JAA The K-H Executive Office – Providing strategic direction for work scope to K-H and subcontractors.
- JAB General Counsel and Audit – Project Management tool to allow project work to be performed in accordance with all laws and regulations.
- JAC Strategic Planning and Integration – Providing assistance and support to managers of mission projects as well as key site project teams and RFFO.
- JAD Administration - Providing key mission support to the RFCP and sized to provide only the required support to mission specific projects.
- JAE Steelworker Overhead – Managing costs associated with the steelworkers that cannot be accurately charged directly to a specific project.
- JAF Major Subcontract G&A/Fee – Capturing corporate costs for major subcontractors through FY00. These costs become direct charges to projects after FY00.
- JAG Fringe Benefits – Collects fringe benefits for K-H, major subcontractors and construction trades.
- JAH Subcontractor Incentive Fee
- JAJ Workforce Restructuring – Includes the cost of reduction in force and employee career transition assistance

### 3.10.2 Activities and Approach

The PBD J, Support Project, supports each project using a core group of multi-skilled individuals. Administration forms the majority of PBD J, which includes functions such as procedure updates. All procedures are processed through PBD J, which then disseminates information to individual projects. In addition to personnel support, all site functions and costs excluding cost of electricity are included under the PBD J budget. PBD J also includes all K-H business expenses including insurance, workman's

compensation, claims, medical premiums for retirees, and severance costs. All DOE funding is processed through the PBD J Support Project. In addition, an annual work analysis is submitted to RFFO in July, identifying current indirect rates and required internal adjustments required in the project. These indirect rates are used for billings, but do not affect the $657M/year funding.

There is active interface between the K-H PBD J Support Project and all other K-H projects, but no direct interaction between the K-H PBD J Support Project and the RFFO PBD J Support Project Group, which was expected because this K-H function is primarily internal to K-H operations. However, there are some areas such as the work procedure updates, which should be coordinated between K-H and RFFO at the PBD J level to insure that all critical documentation is in place for each project. To accomplish this, guidelines or specific procedures should be developed to define regular coordination between K-H and RFFO.

Prior to discussions held with both the K-H and RFFO PBD J Support Projects, it was assumed that the "Support" project was the one that pulled status information together from each of the other projects, and then evaluated and summarized that information on a total program basis. However, this was not the case, noting that PBD J is primarily administrative. K-H does this kind of evaluation within their Strategic Planning & Integration group and provides a representative to the RFFO PBD J group. RFFO is much more limited in their overall review and evaluation.

Guidelines and procedures must be developed for coordination and evaluation of each project's status against total program requirements to achieve interim closure of Rocky Flats within or under budget and schedule. This requires one-to-one K-H and RFFO coordination at the project level including project control and cost estimating expertise in these areas from each organization to understand, identify and resolve problems. These guidelines and procedures must me in place and defined under a Project Execution Plan (PEP) to insure consistent and effective performance measurement within and between projects by K-H and RFFO. This would also provide a more consistent basis to benefit from lessons learned and a better understanding of funding constraints monitored through the PBD J Support Project.

### 3.10.3 Cost Estimate: Process, Procedures/Details

#### 3.10.3.1 Cost Methodology

Area "J" baseline cost estimate was developed entirely from a level of effort cost methodology. Area "J" and "H" are very similar in their cost estimating methodologies. Wage rates and subcontractor labor costs were extrapolated from onsite ongoing and historical experience. Estimates were prepared in accordance with the guidelines established in the KH Cost Engineering and Cost Estimating Manual. No D&D or construction costs are included in Area "J". No unit cost guidelines have been used or apply to this area. Significant experience from ongoing operations, safety, training, and quality assurance activities was used in the preparation of the baseline cost estimates.

Materials, supplies, travel, and other miscellaneous expenses were also based on recent (prior year or two) historical costs incurred on site.

### 3.10.3.2 Cost Review

The services provided should support a wide variety of work scopes from the other areas. As the project scopes of work become more defined through additional engineering, Area "J" should not have to modify or alter their costs. All of the level of effort support services and subcontracts appear to be reasonably calculated and applied.

## 3.10.4 Schedule

There are no P3 schedules for the K-H PBD J, Support Project. Activities are level of effort and primarily for Administration, but also include the K-H President's Office, Strategic Planning and Integration and other areas as described above. Discussions related to performance measurement include the following:

- Cost Account Plans – As noted, there are 9 cost accounts. The Support Project activities are level of effort, and therefore, earned values are statused by the central Planning and Integration group. There are no pre-determined work activities for deliverables.

- Variance Reporting – There are only cost variances because activities are level of effort. These are recorded similar to other projects and provide input to the monthly progress report for discussion between K-H and RFFO. Generally, the PBD J Support Project is stable from month to month.

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# Appendix A

# Burns and Roe Team Members

# For

# Rocky Flats Integrated Closure Project Baseline

# External Independent Review (EIR)

## DONALD N. GRACE, PE;
## Project Manager

Mr. Grace has over 30 years of hands on management and technical experience in the energy and environmental fields. Following graduation with distinction from the US Naval Academy he was a nuclear trained and qualified naval officer. While serving aboard two submarines, he was responsible for the operation and maintenance of power plant and weapons systems. After receiving a Masters in Business Administration from Harvard Graduate School of Business, he worked for 17 years in primarily engineering and project management positions with an electric utility. For the past 10 years he has worked in management positions for Burns and Roe on DOE Projects. He has first hand experience with all phases of a facility project life cycle (design, construction, testing, commissioning, and operations).

Mr. Grace has spent the last ten years with Burns and Roe in various management positions assigned to work on DOE defense and environmental projects. He is currently the Project Manager for a contract where Burns and Roe performs independent reviews of major DOE projects for the DOE Office of Engineering and Construction Management. He is thoroughly experienced with the DOE budgeting process and project management practices. He recently was the Site Manager responsible for completing construction, training of the site operations staff, and demonstration testing of a new Plasma technology used for the irreversible destruction of chemical weapons. He completed a two-year assignment in Los Alamos, NM as Project Operations Manager on the Accelerator Production of Tritium (APT) project. In that position he established an over-all system of management plans and procedural controls (including Baseline Change Control). As Project Engineering Manager on the New Production - Modular High Temperature Gas Cooled Reactor project, he managed a staff of 130 personnel in the design and licensing of the facility tritium handling systems, buildings and structures, and balance of plant systems. The preliminary engineering phase was completed when the project was canceled due to changed DOE missions. He worked for two years as part of a Booz-Allen & Hamilton led DOE EM-40 (Environmental Restoration) support contract in Germantown, MD, largely in improving project management performance measures and reporting, economic analyses, and privatization. While there he published a paper titled *Use of Return on Investment Based Planning Models as an Aid to Optimizing Environmental Restoration Program Decision Making,* presented at the August, 1995 Environmental Restoration Conference in Denver, Colorado.

As the Engineering Projects Director of the Oyster Creek Nuclear Power Plant, he directed the largest operating plant safety and reliability upgrade program of any domestic nuclear power plant. The plant has continued to be in commercial operation since 1969, and this $0.5B effort resulted in keeping the plant operational and protecting the owner's investment. He served as the first elected Chairman of the Boiling Water Reactor (BWR) Owners' Group and in that capacity represented the BWR utility owners to the Nuclear Regulatory Commission.

He is a member of the American Nuclear Society and has served on the Reactor Safety Executive Committee and the Accelerator Applications Executive Committee.

## CHANDER BIJLANI, P.E.

### Principal Nuclear/Safety Engineer

Mr. Bijlani has worked 27 years at Burns and Roe in various assignments as a safety engineer responsible for systems review, analyses and evaluations, and as a principal nuclear engineer performing the design and analyses of plant facilities and support systems. He has Bachelors degree in mechanical engineering, Masters in thermal engineering and a Ph.D. from the Indian Institute of Technology at Bombay. He is a registered professional engineer in New Jersey and Pennsylvania

For the past four years, Mr. Bijlani has worked on the Accelerator Production of Tritium (APT) project at Los Alamos as a safety engineer responsible for the safety review of system designs, and systems analyses for compliance with safety criteria. He has authored portions of the Preliminary Safety Analysis Report, and worked as a member of the team evaluating system designs based on risk assessment. He has provided a wider and in-depth perspective to engineering through inter-disciplinary experience in nuclear and non-nuclear practices in engineering design and licensing.

Mr. Bijlani is an active member of the Burns and Roe Independent Review Team. He served as a task leader performing and coordinating an Independent Cost Estimate review for the Savannah River Environmental Remediation Program. He also performed an evaluation and prepared a report for DOE on cost estimating trends at DOE sites.

Mr. Bijlani has over 20 years experience as a principal nuclear engineer designing and analyzing support systems and facilities for several advanced nuclear reactors including:

- Advanced Simplified Boiling Water Reactor (SBWR) – He designed and analyzed an innovative passive decay heat removal system to condense steam. He also analyzed combined heat and mass transfer in the lined containment concrete structure following a LOCA, and supervised high temperature concrete testing at Northwestern University.
- Modular High Temperature Gas Cooled Production Reactor (NP-MHTGR) – He was responsible for the design of aqueous and gaseous radioactive waste systems, and served as a DOE consultant to review the design of the passive reactor cavity decay heat removal system.
- Advanced Liquid Metal Reactor Plant Program - He designed and analyzed a passive air-cooled spent fuel storage facility.
- Advanced Light Water Reactor Project (AP600) – He performed conceptual design and analysis of the containment cooling system using natural convective evaporation of water.
- Clinch River Breeder Reactor Plant – He was Manager, Nuclear/Mechanical Systems Engineering responsible for design of radioactive waste systems, general arrangements, thermal analyses, sodium fire protection, writing of component specifications and component procurement. He also was responsible for the design of the inert gas cooling system, HVAC and filtration systems, layout of the facilities and reliability evaluation.

## DEBORAH R. DANIELSON
### Cost Estimator

Ms. Danielson has 30 years of diversified construction and operations cost estimating experience at Burns and Roe. She has most recently been responsible for cost estimating relative to major utility and industrial plants including nuclear and fossil-fueled power, cogeneration, waste-to-energy and process facilities for commercial as well as government projects. Duties include interface with contractors, engineers, clients and vendors for the development of cost estimates and construction cost estimates utilizing the corporate "Success" Estimating System. This Estimating System is a Burns and Roe database that has been developed and is constantly updated to reflect project experience and actual cost data collected from various job sites. The use of this database is optimized by providing the basis of a project with appropriate adjustments being made to suit site conditions, including logistics, field labor rates, labor availability and productivity.

Major Estimating assignments have included the following:

- Accelerator Production of Tritium Project - Los Alamos National Laboratory, Los Alamos, NM
- Plutonium Disposition Project – DOE Office of Fissile Materials Disposition – MOX Fuel Fabrication Facility, Pit Disassembly and Conversion Facility and Plutonium Immobilization Facility
- Evaluation of Russian Proposals Fossil Fuel Upgrade for the Department of Defense - Preparation of Independent Cost Estimates for Coal Plant Upgrade Options
- National Ignition Facility Project Cost/Schedule Baseline Review – Lawrence Livermore National Laboratory
- Independent Cost Estimate for the Tritium Facility Modification and Consolidation Project, Savannah River Site
- 250 MW Ravenswood Cogeneration Facility for KeySpan Energy
- Several Resource Recovery Facility Boiler Expansions for Wheelabrator Technologies, Inc.
- 500 MW Combined Cycle Plant, Astoria, NY for the New York Power Authority
- Repowering of the West Springfield, MA Power Plant
- Installation of Spent Fuel Pool Cooling System at the Indian Point Nuclear Power Plant, Buchanan, NY
- PEGI Cogeneration Plants, Monterrey, Mexico for Energy Works
- Turnkey EPC Estimates for Peaker Plants in Illinois and Mississippi for Entergy Power Group

Ms. Danielson has completed training courses on Power Plant System Basics, Microsoft Excel Program, Success Estimating Program and R&R Report Writer Program. She has a U. S. Department of Energy (DOE) clearance.

## SCOTT E. FOSTER

### Supervising Estimating Engineer

Mr Foster has over 15 years of estimating experience with a strong specialty in electrical and instrumentation for conceptual one of a kind and pilot projects. His estimating experience focuses in major industrial and process related facilities in preparation of estimates relative to project capital costs, bid evaluations, engineering studies and contract and engineering changes and U.S. Department of Energy (DOE) Independent Cost Estimates (I.C.E.). He has worked on numerous unique industrial and utility projects including nuclear and fossil-fueled power generating, cogeneration and resource recovery plants, environmental restoration, and national scientific and defense projects.

At Burns and Roe, Mr. Foster is responsible for preparing cost estimates for commercial and nuclear projects and facilities, some of which were first-of-a-kind, such as:

- Plutonium Disposition Project (DOE) - Cost Estimate Reasonableness Review for domestic facilities including the MOX Fuel Fabrication Facility, Pit Disassembly and Conversion Facility and Immobilization Facility.
- Accelerator Production of Tritium (APT) Project (DOE) - Prepared the conceptual design cost estimate for the Tritium Separation Facility, and the electrical and instrumentation accounts within the Balance of Plant.
- Precision Munitions Facility Picatinny Arsenal – Engineering, Procurement, construction bid preparation.
- National Ignition Facility Project Cost/Schedule Baseline Review – LLNL
- Independent Cost Estimate Reviews including:
- Tritium Facility Modification and Consolidation Project I.C.E., Type III (with some Type IV elements, Savannah River Site
- Capability and Maintenance Improvement Project (CMIP) I.C.E., Type V, LANL, Pit Production Upgrade
- National Spallation Neutron Source (NSNS) I.C.E., Type V, ORNL
- Kansas City Plant, Phase 2 (KCP2) I.C.E., Type II, Plant Reorganization
- Environmental Remediation SRS, I.C.E., Type V, Aquifer Cleanup, Waste Burial
- Cold Vacuum Drying System I.C.E., Type III, Hanford
- Tank Waste Remediation System Privatization Project, Hanford, Type II
- Numerous reviews of the Fissile Materials Disposition Project for the PDCF, MOXFF, and PIP facilities at Pantex, Hanford, INEEL and SRS sites.
- Several estimates of desalination facilities for the Department of the Navy and a baseline reconciliation for the DOE Fernald Environmental Management Project
- Numerous estimates for government facilities at military bases, nuclear and fossil power plant system additions and upgrades, advanced nuclear plant designs, and national laboratory modifications.

Mr. Foster has had Field Engineer/Superintendent experience on instrumentation, power, control systems, and general building services. He supervised subcontractors, prepared work activities, tracked contract dates, and was responsible to owner's representatives for job status. He has a BS in Electrical Engineering and DOE Q Clearance.

## DONALD N. FULTONBERG
## Senior Supervising Engineer

Mr. Fultonberg has over 40 years of experience in the nuclear industry and on accelerator programs in program and configuration management and systems engineering; nuclear plant long range and outage planning and management; and financial, strategic and life cycle planning. He is currently responsible for Configuration Management plans and procedures for the Accelerator Production of Tritium (APT) program and involved in their implementation. On APT, Mr. Fultonberg also developed the Value Engineering program, the Systems Engineering Plan for the project as well as the top level Project Execution Plan and implementing procedures for all project participants. He is an active member of the Burns and Roe Independent Assessment team participating in several External Independent Reviews and Independent Cost Estimate Reviews.

He was previously responsible for establishing long range planning at a commercial nuclear utility and integrating it with outage and strategic planning that led the plant to be a leader in the industry. He developed the process and led its implementation for the evaluation and selection of the plant modifications and improvements to be performed during refueling outages that led to the plant running two years between outages while dramatically reducing outage duration. The process included performing assessments of the scheduling, planning, resource management, procedures & work practices for the outage preparation & its management. Company long range & strategic planning was a major element of the process.

Mr. Fultonberg later employed the same process as owner and principle engineer of his own consulting company where he completed assessments of plant refueling outage preparation, and outage implementation for Utilities at other operating commercial nuclear plants. The product of each was a report recommending changes in processes and practices that could and did improve outage performance and reduce its duration.

Mr. Fultonberg served as a resident manager for the prime contractor of the Clinch River Breeder Reactor both at another reactor manufacturer and at the AE where he coordinated the solution of technical problems including plant layout and arrangement and space utilization, definition and resolution of critical items, and ensuring communications between engineering and management at interfacing organizations. He was also Program Control Manager responsible for the preparation & implementation of procedures & practices for the breeder reactor program.

Early in his career, Mr. Fultonberg performed nuclear reactor heat transfer and fluid properties tests and analyzed the test results for improved commercial pressurized water reactors; designed irradiation experiments and analyzed the results; and designed, fabricated, and tested simulated piping system experiments for nuclear propulsion programs. He was responsible for the planning, scheduling, and the methods and controls for the reactor experiments in the demonstration Carolina-Virginia Tube Reactor.

He has a Bachelor of Chemical Engineering, has taken advanced degree college courses and participated in many company sponsored management training programs. He had Q clearance early in career and has active clearance for National Laboratory access.

## STEVEN M. GERTZ, Ph.D., CHMM, CHCM

### Environmental Engineer

Dr. Gertz has over 30 years of progressively responsible broad and in-depth environmental, safety and health experience with specific expertise in hazardous, radiological and toxic waste management to include remedial investigations, feasibility studies, and remediation of controlled and uncontrolled waste sites. This experience has encompassed preparation of environmental impact statements and assessments, cost estimates, field health and safety plans, field sampling and analysis plans, pollution prevention and waste minimization plans, and numerous other environmental, safety and health documents. Dr. Gertz has a Ph.D. in environmental engineering, is a Certified Hazardous Materials Manager and Certified Hazard Control Manager, and holds a DOE Q clearance. His experience includes program, project and task management on numerous projects for the DOE, EPA, national laboratories, nuclear utility industry and other federal and commercial clients including:

- Environmental, safety and health manager for the DOE's Accelerator Production of Tritium Program; included participating in the EIS process, identifying environmental permits, determining emission inventories and rates, developing and evaluating design documents for good environmental and engineering practice, and developing waste management, pollution prevention and hazardous waste minimization plans.
- Project director for technical support of the DOE's EM-40 Program to Booz, Allen and Hamilton; included generation, review, and evaluation of technical requirements, engineering studies, site assessment studies, cost estimates and corollary activities as related to assessment and remediation of inactive and active waste sites, decontamination and decommissioning projects, and surplus facilities management.
- Task manager for the radiological impact assessment, remedial investigation, and feasibility study and prepared and coordinated the prototype Environmental Impact Statement for the Burrel and Canonsburg Township sites for Sandia Laboratories under the DOE's Urannium Mill Tailings Remedial Action Program.
- Task manager for the radiological assessment and impact evaluation, remedial investigation, feasibility study and remedial design at the St. Louis Airport Storage Site for Oak Ridge National Laboratory under the under the DOE's Formerly Utilized Sites Remedial Action Program.
- Prepared for DOE's Pittsburgh Energy Technology Center a PCB management system, SPCC plan, groundwater protection program, hazardous waste management/minimization plans, other environmental, health, and safety plans and procedures, and updated the current preparedness, prevention and contingency plan.
- Associate program and health and safety manager EPA's Nationwide Spill Prevention and Emergency Response Program's to support EPA's efforts in responding to releases of hazardous materials and oil, uncontrolled hazardous waste sites, and assessment and remediation of uncontrolled hazardous waste sites.
- Project director for EPA's Agency Alternative Remedial Contract Strategies (ARCS) program in Region II which included site specific project management and remedial planning, design, and implementation eight hazardous waste sites.

## CHARLES W. HESS, P.E.

### Chief Nuclear Engineer

Mr. Hess has extensive experience in management, engineering, design, modification, and decommissioning of commercial nuclear power plants and US DOE facilities. He has been employed by Burns and Roe for 24 years where his assignments have been diverse, including "first-of-a-kind" projects as well as other projects, requiring initiative and a wide range of engineering skills to solve unique problems. Duties on these projects included responsibility for the day-to-day direction of engineers and designers engaged in the development of these facilities. His scope of responsibilities includes management, technical direction, budgeting, scheduling, criteria development, preparation of general arrangements and flow diagrams, specifications, procedures, system descriptions, study reports, cost estimates, safety analyses, and environmental reports. The work was done in accordance with DOE Orders and various ANSI and ASME codes and standards.

As the Chief Nuclear Engineer, Mr. Hess is responsible for managing and overseeing all nuclear engineering, design, and licensing performed by Burns and Roe. He is thoroughly capable of performing production engineering and safety analyses of safety-related and radwaste systems for nuclear power plants. His background includes extensive work on nuclear decommissioning projects and he is qualified to make entries into RWP Controlled areas of nuclear power plants. Major assignments have included:

- Project Engineer for support to DOE Office of Fissile Materials Disposition for Russian plutonium disposition project including evaluation of engineering and processes, roadmap and facility schedule development
- Project Engineer for BREI's DOE/PNNL International Nuclear Safety Program work in Russia, Armenia, the Ukraine, Lithauania and the rest of the Former Soviet Union.
- Performed a overall reasonableness review (Type II I.C.E.) for the project cost and schedule for the Hanford Spent Nuclear Fuels Project for the DOE, and a Cost/Schedule Baseline Review for the National Ignition Facility Project– LLNL.
- Lead engineer responsible for the conceptual design of the Fuel Recycle Facilities for the Advanced Liquid Metal Reactor fuel and the ALMR Plutonium Disposition Project.
- Represented Burns and Roe on the Life-Cycle Asset Management DOE Working Group that developed the Implementation Guide for Nonreactor Nuclear Facilities Safety Design
- Prepared radwaste cost estimates and performed radiological risk assessments associated with the handling of radioactive wastes generated by the decommissioning of the Shippingport nuclear power plant.
- Performed defueling system design reviews and radwaste management technical reviews for the post-accident Three Mile Island Nuclear Unit 2.

Mr Hess has a Bachelor of Science in Nuclear Engineering, Pennsylvania State University and is a Registered Professional Engineer in Pennsylvania. He is a member of the American Society of Mechanical Engineers. He has published papers on TMI-2 post-accident cooling, epoxy coatings and design of a pyroprocess recycle facility.

## WALTER R. KRZASTEK
## Manager, Cost Estimating

Mr Krzastek has over 35 years experience in managing the engineering, construction, and cost estimating functions mainly associated with government, power and industrial facilities. He has been with Burns and Roe for 15 years and is currently the Manager of Estimating. His responsibilities include directing department personnel on estimate preparation for all government, power and industrial facilities. Mr. Krzastek has directed the preparation of detailed construction schedules that included weekly site visits to monitor job progress. He investigates construction cost problems critical to the company and generates reports on the findings with recommended solutions. As Manager of Estimating, Mr. Krzastek's responsibility has included the following recent major estimating projects:

- Accelerator Production of Tritium (APT) Project
- Project cost estimating for power plant projects within Russia and other FSU countries for the USAID Program
- Key cost estimator for Burns and Roe external independent reviews for the DOE and the I.C.E. Program since 1993 for Yucca Mountain, Fernald, Rocky Flats, Hanford, LLNL, Oak Ridge, SRS and Los Alamos.
- Plutonium Disposition Project, MOX Fuel Fabrication Facility, Pit Disaasembly and Conversion Facility, and the Plutonium Immobilization Facility
- Tritium Facility Modification and Consolidation at SRS

Mr. Krzastek has had recent responsibility for developing cost estimates for a number of other first-of-a-kind projects for the Department of Defense, Department of Energy, Department of Interior, and nuclear reactor suppliers. These estimates generally covered design, procurement, construction, startup and testing, and operation. Development of the appropriate contingency factors due to the first-of-a-kind nature of these projects is considered a major challenge that benefits from Mr. Krzastek's experience. He is also responsible for the preparation of cost estimates for the design, procurement and construction of coal-fired power plants and combined cycle and cogeneration facilities as well as various types of process plants.

Prior to joining Burns and Roe, Mr. Krzastek was Manager of Engineering/Estimating for a national construction company where he was responsible for all estimating, proposal preparation, field engineering, project engineering, cost engineering, scheduling and purchasing for all major construction projects. Projects included almost every type with a heavy emphasis on power and industrial related projects, projects in waste and water treatment including the massive clean up in Boston Harbor. Many of the personnel in the Northeast regional office reported to Mr. Krzastek. He also worked extensively in Business Development at that firm and several others including his own consulting firm in identifying new opportunities and markets, including negotiating with owners and pursuing joint venture design/build and turnkey projects. Active involvement in the strategic planning process, division budgeting and training of personnel in computerized estimating.

Mr. Krzastek has a Bachelor of Science and advanced courses in construction estimating and bidding. He is former Vice President of the American Association of Cost Engineers, has a DOE Q Clearance and has taught several seminars in cost estimating including, *The Estimating of First-Of-A-Kind Facilities from Conceptual Information.*

## NORMAN H. LACY, P.E.
## Decommissioning Project Manager – Principal Engineer

Mr. Lacy has over 25 years of experience with Burns and Roe in the engineering and design, modification, and decommissioning of nuclear power plants and DOE facilities. He has been responsible for the design or decommissioning of these facilities with a scope of technical direction, budgeting, scheduling, criteria development, preparing drawings and specs, procedures, system descriptions, studies, cost estimates, safety analyses, and environmental reports. The work includes "first-of-a-kind" projects done in accordance with DOE Orders and various ANSI and ASME codes and standards.

Mr. Lacy is a member of the Burns and Roe Independent Review Team for DOE facilities responsible for performing an independent evaluation of the costs, methods and schedules for DOE construction projects. These assessments are used to identify any outstanding technical and programmatic issues and to provide external project oversight. He recently participated in the review of the Spallation Neutron Source at Oak Ridge, the National Ignition Facility at Lawrence Livermore, and the Tritium Facility Modernization & Consolidation facility at Savannah River. He previously was totally responsible for the ICE of the DOE Oak Ridge and Rocky Flats facilities for the environmental restoration and decommissioning work being performed at these two DOE sites.

Mr. Lacy was Project Engineering Manager for the Reactor Vessel and Internals Removal, and Project Engineer for Large Component Removal Projects at Trojan. His responsibility included the removal of activated/contaminated reactor vessel with its internals, the steam generators and the pressurizer. The method used and packaging design for the reactor vessel removal was the first-of-its-kind for a reactor of this size. He was responsible for licensing/engineering documentation, preparation of engineering procedures, specifications, schedules, work plans, and quality assurance documents in support of the construction work and support of the actual decommissioning work.

Mr. Lacy's decommissioning experience also includes consultant to DOE to evaluate and recommend approaches to the decon and decommissioning of DOE's gaseous diffusion plants. He also served as lead engineer for the planning, engineering, and licensing support of the Shippingport Station Decommissioning Project, a first-of-a-kind for the complete decontamination and decommissioning of a commercial nuclear power plant.

Mr. Lacy's experience includes responsibility for the preliminary design of the DOE MHTGR New Production Reactor Plant with technical direction, budgeting, scheduling, and criteria development. It also includes responsibility for numerous modification projects in support of operating nuclear plants such as Susquehanna, Oyster Creek, Palo Verde, and the Three Mile Island Nuclear plants. He was responsible for several recovery systems for the Three Mile Island Accident Recovery Project.

Mr. Lacy has a Bachelor of Science in Mechanical Engineering and a Master of Science in Management Science. He is a registered Professional Engineer in the State of New Jersey. He has authored and co-authored several papers on nuclear radwaste topics.

## VERNON E. PETERSON
## Senior Estimating Engineer

Mr. Peterson has over 24 years of cost estimating experience at Burns and Roe on numerous industrial and utility projects and on many projects sponsored by several government agencies. He has been a cost estimator/reviewer on projects as diverse as nuclear and fossil-fueled power generating stations and modifications thereto, co-generation and resource recovery plants, environmental restoration projects, research and development activities, and national scientific and defense projects.

For the past four years, Mr. Peterson has provided cost estimating support both in the field at Los Alamos and from the home office on the APT Project Team as a Senior Estimator preparing Conceptual and Final Design Report estimates and studies and Life Cycle cost estimates. He interacted with engineers and designers in gathering design and scope information to ensure the estimates represented the latest information for the first-of-a-kind cost estimates being developed. He also developed a file of vendor suppliers for specialized equipment and materials for the project.

Mr. Peterson has been a participant in many U.S. Department of Energy (DOE) Independent Cost Estimates (ICE) and Congressional Review teams preparing reports on various projects that were under review, e.g. Pit Production, Safeguards and Security, and Stockpile Storage. Specific experience in this area includes:

- Capability and Maintenance Improvement Project (CMIP) I.C.E., Type V, Los Alamos National Lab (LANL), NM, DOE; Pit Production Upgrade
- Independent Cost Estimate for the Tritium Facility Modification and Consolidation Project, Savannah River Site, DOE
- National Spallation Neutron Source (NSNS) I.C.E., Type V, Oak Ridge National Lab (ORNL), TN, DOE
- Kansas City Plant, Phase 2 (KCP2) I.C.E., Type II, Kansas City, MO; Plant Reorganization and Consolidation
- Spallation Neutron Source (SNS), Oak Ridge National Lab (ORNL), TN, DOE, joint venture design-build proposal with Fluor Daniels, Inc.
- Cryofracture Incineration Demonstration Project (CIDP), Pueblo, CO, Department of Defense
- Assembled Chemical Weapons Assessment Program (ACWAP), Pueblo, CO and Lexington, KY, U. S. Army
- Advanced Vitrification System (AVS), Hanford, WA, DOE

Mr. Peterson previously provided cost estimating support at Burns and Roe for the Clinch River Breeder Reactor, Clinch River, TN., a first-of a kind project for which Burns and Roe was the architect/engineer responsible for all building, structure, site, and balance-of-plant systems design.

Mr. Peterson is certified in the use of the Corps of Engineers M-CACES Gold cost estimating system, and the DOE INSITE Parametric and USCost SUCCESS cost estimating systems. He has "Q" Clearance – Top Secret, Restrict Data, and National Security Information for the DOE.

## MARK RANDAZZO
## Construction Manager

Mr. Randazzo has 18 years experience with the construction of power, commercial and industrial projects. His estimating expertise includes earth quantities, piles, structural steel, concrete, architectural, etc. He also has significant experience in construction management and contract administration including budgeting, change order review/negotiations, purchasing of materials and contracts, and coordination of trades and scheduling. He has supported various DOE Independent Cost Reviews (ICE).

Mr. Randazzo has been with Burns and Roe for over 7 years where he has participated in the Burns and Roe Independent Review Team for several DOE facilities. In this capacity, he has been responsible for performing an evaluation of the cost estimates for the DOE construction projects:

- National Ignition Facility Project Cost/Schedule Baseline Review – Lawrence Livermore National Laboratory
- National Spallation Neutron Source (NSNS) I.C.E., Type V, Oak Ridge National Lab (ORNL), TN, DOE
- Desalination Facility Guantanimo Bay, Department of Navy
- Environmental Remediation, Oak Ridge, Tennessee (ORNL), I.C.E., Type V, DOE; Aquifer Cleanup, Waste Burial

He also participated in the preparation of the cost estimate for the Accelerator Production of Tritium (APT) Project conceptual design, concentrating in the complex Target/Blanket Facility and the Civil/Structural accounts within the Balance of Plant.

Mr. Randazzo responsibilities at Burns and Roe to prepare and review cost estimates for major cogeneration and power projects have included:

- A 150 MW gas fired cogeneration facility consisting of gas turbines in conjunction with a heat recovery steam generator (HRSG).
- A 340 MW cogeneration facility that included a water treatment facility, steam distribution systems and other associated facilities. A $35M EPC services.
- A 15 MW cogeneration project consisting of uprgading existing boilers to, increasing capability of auxiliary systems, expanding the steam distribution system, and the addition of an energy management information system.
- Two (2) 660 MW coal fired power plants utilizing tandem compound steam turbine generators operating at 2400 psig/1000F.

Prior to joining Burns and Roe, Mr. Randazzo was a Construction Manager or Assistant Construction Manager for a number of industrial projects including office and high-rise buildings, government facilities and schools.

Mr. Randazzo has a Bachelor of Engineering Degree in Civil Engineering with special additional training in Advanced Construction Estimating.

## LAWRENCE RUTLAND
### Principal Engineer

Mr. Rutland has 40 years of experience. His activities draw upon his expertise in nuclear/chemical engineering; and radioactive, mixed waste and hazardous material handling and treatment. This work includes responsibility in many projects in facility/system design, decontamination and decommissioning, and the DOE Environmental Restoration and Waste Management Programs. He has 18 years of extensive experience as a Principal and Project Engineer for Burns and Roe including:

- Participating as a member of the Burns and Roe Team in performing independent reviews and Independent Cost Estimates (I.C.E.) for projects for the U.S. Department of Energy including an ICE for the Environmental Restoration Baseline at the Savannah River Site, and an independent review of the National Ignition Facility Project at LLNL. He also performed a technical analysis of the Hanford tank waste remediation system involving vitrification of low activity waste and high level waste.
- Responsibility for the design of the radioactive, mixed waste and hazardous waste treatment systems for the Acceleration Production of Tritium (APT) facility including incorporation of waste minimization and pollution prevention requirements in Executive Orders, DOE Orders, and U.S. EPA requirements.
- Cost account manager for the design of the reactor building and the solid, liquid and gaseous radioactive waste treatment systems for the New Production, Modular High Temperature Gas Cooled Reactor.
- Support for decommissioning the Shoreham Nuclear Power Station and the Saxton Nuclear Experimental Facility. He supported preparation of the Decommissioning Plans and provided responses to the USNRC in the successful effort to terminate the licenses and release the facilities for unrestricted use.
- Project Manager of Burns and Roe support to the New York State Low Level Radioactive Waste Siting Commission to select a disposal method for the state's low level radioactive waste disposal facility.
- Principal Investigator to characterize advanced volume radwaste reduction installations for nuclear power plants for the Electric Power Research Institute.
- Project Manager for spent fuel racks removal and replacement at a nuclear plant. He also performed economic evaluations of proposals for radioactive waste volume reduction systems for nuclear plants.

Prior to joining Burns and Roe, Mr. Rutland was a Manager of Engineering Services with numerous responsibilities for development of nuclear plant radwaste management programs and decommissioning costs. This involved evaluations, developing designs and plans and safety analysis. He served as a consultant to nuclear power utilities and performed several studies for U.S. governmental agencies regarding radioactive wastes. He developed and manufactured radwaste solidification and filter-handling systems used in many nuclear power plants in the United States and abroad.

Mr. Rutland has a Master of Science in Chemical Engineering and is a registered Professional Engineer in the State of New Jersey.

## VINCENT SILVESTRI
### Nuclear Engineer

Mr. Silvestri is currently a Nuclear Engineer working with Burns and Roe. In the four years he has been with the company, he has performed a variety of government and commercial power project tasks that include engineering calculations and evaluations, design and installation preparation, and construction and start-up services. His experience on Department of Energy (DOE) projects is extensive in lieu of his short time with Burns and Roe.

Mr. Silvestri has participated in scope definition and client review meetings for the Independent Assessments (IA) of DOE projects. He completed the following specific tasks for the projects listed below:

- Reviewed the technical scope, budget, and project management/control policies and procedures of projects in excess of $20 million.
- Prepared the Final IA Reports.

DOE projects:

- High Level Waste Removal from Filled Waste Tanks at the Savannah River Site (SRS)
- Regulatory Monitoring and Biological Assay Laboratory (RMBL) at the SRS
- F-Area Tank Farm Services Upgrade at the SRS

Mr. Silvestri has participated in scope definition and client review meetings for Cost Benefit Analysis (CBA) of DOE Projects. He completed the following specific tasks for the Relocation of the Environmental Measurements Laboratory (EML) from New York City to Brookhaven National Laboratory (BNL):

- Performed present worth, life cycle cost, and escalation calculations in a Microsoft Excel spreadsheet format.
- Evaluated various alternatives for relocation.
- Prepared the CBA Final Report.

Mr. Silvestri has worked extensively on the DOE's International Nuclear Safety Program (INSP). He has completed the following specific tasks:

- Performed a reasonableness evaluation of Chekhov's (Russian manufacturer) material cost estimate for the fabrication of a prototype Main Steam Isolation Valve (MSIVs) and Main Steam Safety Relief Valve (MSSRVs).
- Performed a reasonableness evaluation of the Armenian Nuclear Power Plant's (ANPP's) Service Water (SW) Construction Cost Estimate.
- Completed the technical specifications for the ANPP Main Steam Isolation Valves (MSIVs), Auxiliary Feedwater (AFW) Pump, and Service Water (SW) Pumps in accordance to US standards (i.e., ASME and API).

Mr. Silvestri has a Bachelor of Science in Physics and 30 credits towards a Master of Science in Nuclear Engineering.

## JOHN B. STEVENS, P.E.
## Project Manager-Principal Planning Engineer

Mr. Stevens has 34 years of experience in engineering design, management of engineering and project controls. At Burns and Roe for 25 years, he has been responsible for coordination, implementation and development of planning, scheduling and cost control systems for the company as well as active participation in projects. Mr. Stevens' background as an engineer along with extensive project controls experience provide the necessary expertise to effectively manage projects as well as develop, monitor and update all levels of schedules, project and control manpower and dollar expenditures against activities responsive to Project Management and Client requirements.

He has served as Burns and Roe's Project Controls Manager, overseeing planning and control of costs and schedules for engineering, design, procurement, construction, test and start-up activities. He has actively participated in numerous projects including those requiring full compliance with government Cost/Schedule Control System Criteria (C/SCSC) and more recently, compliance with updated criteria responsive to DOE 413.1, Program and Project Management and DOE 430.1A, Life Cycle Asset Management. In addition, he has developed and effectively implemented Performance Measurement Systems to monitor, analyze and report project performance parameters utilizing computer-based project control systems such as Primavera on many projects including government First-of-a-Kind programs. Major project assignments have included:

- Independent Cost Estimates (ICE) - DOE, Washington D.C. Burns and Roe Team Member responsible for schedule and cost review of National Spallation Neutron Source (NSNS) and Tank Waste Remediation System (TWRS) projects including document reviews against established design scope documents and coordination with DOE to resolve findings.
- Plutonium Disposition Project – DOE Office of Fissile Materials Disposition (OFMD), Washington, D.C. – Project Manager for Burns and Roe support to OFMD for domestic and Russian plutonium disposition projects including facility schedule development, preparation of cost estimating guidelines and reasonableness reviews.
- Accelerator Production of Tritium (APT) Project – DOE, Albuquerque – Project Controls Manager responsible for development of integrated schedules, cost plans and cost performance reports. Also supervised coordination of cost estimate preparation for the Conceptual Design Report (CDR).
- AP600 Program - Schedule and cost control for engineering and design studies provided under contract to Westinghouse to DOE for First-of-a-Kind design of a 600 Mwe Advanced Pressurized Water Reactor plant including detailed plant layout schedule studies to accommodate modular construction.
- Modular High Temperature Gas Cooled Reactor Plant (MHTGR) - Supported implementation of Burns and Roe's Performance Measurement System (PMS) required for full compliance to DOE's C/SCSC. Participated in developing schedule logic for the Intermediate Level Integrated Schedule Network using Primavera.

Mr. Stevens has Bachelor of Architectural Engineering Degree and is a Registered Professional Engineer in New York.

## JOHN M. TUOHY, Jr. PE
## Director, Advanced Technology

Mr. Tuohy has 31 years experience in the Nuclear Industry holding positions involving decommissioning, detailed design of light water reactors and sodium cooled breeder reactors, TMI recovery team, and modifying the tritium systems for the Tokamak. He has also taught a total of 13 years at both the undergraduate and graduate level, three years of which was as a full time member of the Mechanical Engineering faculty at Manhattan College.

Mr. Tuohy currently directs the efforts of a group of engineers comprising the Advanced Technology Services (ATS) Division at Burns and Roe. This group consults for industry and government in complex technological areas generally having some relation to the National or International Nuclear Complex. The ATS Division also provides EPC services and seeks to identify and apply promising innovative technologies that provide value to client operations.

Mr. Tuohy has extensive experience decommissioning contaminated industrial facilities. He has undertaken major decommissioning efforts throughout the United States including contracts at Los Alamos, Oak Ridge and multiple FUSRAP sites. His accomplishments include K-1131 at Oak Ridge, which the local press referred to as the "Nastiest building on site" (K-25). He also decommissioned the Radium Chemical Company Superfund Site in New York City supporting the Army Corps of Engineers. He received a commendation for his support in successfully carrying out this difficult assignment.

Mr. Tuohy has over 20 years experience in light water reactor detailed design. He directed a design team modifying generating stations across the country in compliance with regulatory changes emanating from TMI lessons learned. In 1988 Burns & Roe named Mr. Tuohy as "Engineer of the Year" recognizing him for his achievements at work, in Professional Associations and in his community where he volunteers his talents as a Member of the Board responsible for the city's electric and water company.

Mr. Tuohy has been an active member of ASME for over 25 years and is currently serving on the ASME Nuclear Engineering Division Executive Committee. He is a past Chairman of the ASME Radwaste Systems Committee and Technical Program Chairman for the International Waste Management Conference.

Mr. Tuohy received his Bachelors Degree in Mechanical Engineering from Manhattan College in 1967 and his MS in Nuclear Engineering from MIT in 1970. He is a member of Tau Beta Pi and a recipient of an Atomic Energy Commission Fellowship.

# Appendix B

# Closure Project Cost Estimating

## Cost Estimate Review and Methodology

An independent cost review was performed by Burns and Roe for the 9 major areas or PBDs (Project Baseline Descriptions) using reasonableness (Type II), parametric (Type III), and sampling (Type IV) techniques. All databases and markups including labor wages, salaries, materials, as well as markups including escalations and contingencies were evaluated for reasonableness. This included a review of the estimate methodology, reliability, completeness, uniformity, cost criteria and assumptions.

Observations as result of the review are discussed below:

- Separate teams within the K-H organization developed each of the 9 PBDs. The development of the baseline cost estimate evolved over a period of time and has roots from the original KH M&O contract. Significant portions of the staffing and support services estimates are from established level of effort tasks that have been ongoing on site since the KH M&O years. Newly developed cost estimates have been estimated for all the deactivation/hazard stabilization and D&D activities as part of the new KH baseline. Approximately ½ of the total project cost is related to level of effort type costs. The remaining ½ of the project costs are part of the D&D activities and associated support of those activities.

- The project cost estimate baseline has been reported in a database format called BEST[26]. Cost estimates were developed then hand inputted into BEST. Typical estimate formats that are usual to the formal baseline supporting DOE projects are not used in this project. All data reporting and estimating references come from BEST. Updates and baseline changes are tracked and supported in BEST. Although necessary for project controls and status tracking of activities the lack of an estimating report standard has made it difficult to evaluate lower levels of cost estimates as reported in BEST. Combined with the fact each PBD was at the time of the baseline acting quite independently of each other, review of the cost estimate details was daunting. Inconsistencies exist in the WBS lettering/numbering format as well as in estimating of subcontracts and individual work scope activities among PBDs. Estimate details varied from level of effort for full time equivalent professional staffing support to extremely detailed quantity surveys, which in some PBDs were used to estimate item by item the required work based on onsite experience. Most of the onsite experience for the D&D activities were developed by interview and hands on detailed reviews with the personnel that performed the actual D&D of Building 779.

  K-H has included cost reducing factors throughout the baseline that take into consideration lessons learned and learning curves through repetitive use of work activities. In lieu of utilizing commercial labor manuals, which only give estimates to the required man-hours for specific work, most of the D&D in one way or another are based on actual onsite experience. No database has been published for this type of

[26] BEST is a proprietary database software program developed and used by K-H. BEST has not been validated or reviewed by Burns and Roe. It is a very sophisticated program and it may be prudent for K-H to perform a validation of this software.

work to date. Use of outside databases for estimate preparation would be less accurate than using the onsite information. Granted the onsite historical experience may contain terrible productivity problems and other factors that make this work look very expensive, but none-the-less its use in developing cost estimates should assure the project that they have sufficient money to complete the project.

- The consistency among each area's baseline cost estimates could be improved. Activities tended to be mixed together without separation of direct and indirect costs. Multiple and wide ranging subcontractor cost units were used differently in each area. Also, it was not clear as to responsibilities for work scope. Although, guideline templates were put in place, there were still inconsistencies within the PBDs defining scope against the framework of the project Work Breakdown Structure (WBS).

- The K-H contract with DOE is cost plus fee with a negotiated target cost. K-H has established contingency, which is effectively the maximum achievable fee and represents the cost difference between the 2005 Working Plan cost estimate and the 2006 Baseline cost estimate. Application of the K-H contingency was based on algorithms written and applied to the BEST cost estimates using Monte Carlo risk analysis run on 2005 Working Plan Primavera (P3) schedule activities. The resulting schedule became the 2006 Baseline schedule, and the total estimated cost including contingency, became the 2006 Baseline cost estimate. Contingencies varied greatly from those normally expected using standard contingency techniques. Because of this uniqueness, which was due to the contract, Burns and Roe did not review the algorithms and resulting contingencies.

- The baselining design information, cost estimates and back up cost data are reasonably well developed for a conceptual baseline as evidenced by the specific areas where cost estimates were reviewed. Although significant quantity details exist for many of these areas significant portions of costs are based on square foot and associated cost methodologies. Each area estimated their work scopes differently in the way they interpreted and used the onsite historical/parametric databases. There are four major conclusions that can be made regarding this high level of independence among the PBDs.
    - One is the time consuming problems that take place in the review process of each area.
    - Two is the inconsistency and potential for inaccuracies that can develop with this approach.
    - Three is the added overheads and redundant manpower that has many different people performing many of the same tasks from area to area.
    - Four is the surprising fact that this approach can produce a serendipitous result of producing an overall better project by way of finding the best solution out of the areas as a template to be used and improved at each step through the project. In other words if each area adhered to a specific work plan and estimate approach newer and more accurate ways of doing work might not be made.

K-H has a unique ability here to keep looking at the best method of getting the work done because they have rather independent groups tackling the work. It is a labor intensive and expensive effort, but it could contribute to the timely closing of Rocky Flats. For this really to occur however, requires a technical oversight function that is involved with all project cost estimates, and it is not clear whether this is happening.

- Overall, the cost estimate has been found to be somewhere within the plus or minus 30 % accuracy as stated by DOE 5700 guidelines.

- Despite the lack of conformity & use of BEST for the baseline cost estimate, the K-H project baseline cost have been found to be professionally prepared and do provide a sound foundation for the project.

- Escalations are applied consistently and according to DOE guidelines throughout the baseline.

- A comparison of the Rocky Flats Closure Project to an equivalent commercial project would reveal a significantly higher cost for RFCP. There are many reasons for the increase in costs. Some areas can be improved on and some areas can not at least without tremendous time and cost efforts that may not be in the best interest of the project. Many solutions and problems are stated elsewhere in this report. However, one such problem that has infiltrated the entire project and has a tremendous cost impact built into the baseline is the impact of the current working rules and "way things are done on site". From the very beginning, in 1951 the highest standards and best available working rules have been in-place in order to safeguard and protect workers and the community as the production of plutonium products continued. These work rules are still in effect today as much as ever despite the fact that weapons production activities were terminated in 1989. Some or many of these rules do not apply to a closure project and do not provide additional safety and in fact potentially decrease safety.

  Just as some old work rules may need to be revised there may be new rules that may need to be implemented. Since this project is a one of a kind operation and a template for future closure projects, any effort spent re-tuning the onsite working rules to the current closure mission would in Burns and Roe's opinion, be very worth while. It is also these working rules and the impact that they are having on site that will potentially cause productivity concerns as the project continues. At this time it is not clear as to whether or not the estimated productivity factors in the baseline are being verified by current field working conditions. Building 771 is the furthest ahead and they most likely will be first to verify these productivity numbers. As a note they also are most well organized and best prepared cost estimates in the project.

- In support of the concern regarding the excessive landlord, management and overhead costs for the Closure Project, Table B-1 is a mortgage table and it can be viewed as a financial model that depicts the following:
  - The "hands-on" real work as the $1.2B principal to be paid.

- A retirement term of six years.
- Equal yearly payments of $657M/yr (that equates to $54.75 M/month).
- A total payout over the six years of 6 X $657M = $3.942B (that represents the baseline cost without fee)

Using mortgage formulae, the monthly principal and interest payments were calculated, as was the interest rate. The calculated interest rate is 52%. This clearly demonstrates the need to (a) simplify/improve work practices (which is equivalent to reducing interest rate, and (b) staying on schedule in accomplishing real work (which is equivalent to making principal payments on time).

# Table B-1, Closure Project Financial Model

| Mortgage Table; Term = 6 years, Starting Prinicipal = $1.2B; Yearly Payments of $657M | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Opening | Monthly Payment | | | | | Opening | Monthly Payment | | | |
| Month | Principal Balance | Interest | Principal | Total | Closing Balance | Month | Principal Balance | Interest | Principal | Total | Closing Balance |
| 1 | 1203.88 | 52.17 | 2.58 | 54.75 | 1201.30 | 37 | 989.09 | 42.86 | 11.89 | 54.75 | 977.20 |
| 2 | 1201.30 | 52.06 | 2.69 | 54.75 | 1198.60 | 38 | 977.20 | 42.35 | 12.40 | 54.75 | 964.79 |
| 3 | 1198.60 | 51.94 | 2.81 | 54.75 | 1195.79 | 39 | 964.79 | 41.81 | 12.94 | 54.75 | 951.85 |
| 4 | 1195.79 | 51.82 | 2.93 | 54.75 | 1192.86 | 40 | 951.85 | 41.25 | 13.50 | 54.75 | 938.35 |
| 5 | 1192.86 | 51.69 | 3.06 | 54.75 | 1189.80 | 41 | 938.35 | 40.66 | 14.09 | 54.75 | 924.26 |
| 6 | 1189.80 | 51.56 | 3.19 | 54.75 | 1186.61 | 42 | 924.26 | 40.05 | 14.70 | 54.75 | 909.56 |
| 7 | 1186.61 | 51.42 | 3.33 | 54.75 | 1183.28 | 43 | 909.56 | 39.41 | 15.34 | 54.75 | 894.23 |
| 8 | 1183.28 | 51.28 | 3.47 | 54.75 | 1179.81 | 44 | 894.23 | 38.75 | 16.00 | 54.75 | 878.23 |
| 9 | 1179.81 | 51.12 | 3.63 | 54.75 | 1176.18 | 45 | 878.23 | 38.06 | 16.69 | 54.75 | 861.53 |
| 10 | 1176.18 | 50.97 | 3.78 | 54.75 | 1172.40 | 46 | 861.53 | 37.33 | 17.42 | 54.75 | 844.11 |
| 11 | 1172.40 | 50.80 | 3.95 | 54.75 | 1168.45 | 47 | 844.11 | 36.58 | 18.17 | 54.75 | 825.94 |
| 12 | 1168.45 | 50.63 | 4.12 | 54.75 | 1164.34 | 48 | 825.94 | 35.79 | 18.96 | 54.75 | 806.98 |
| 13 | 1164.34 | 50.45 | 4.30 | 54.75 | 1160.04 | 49 | 806.98 | 34.97 | 19.78 | 54.75 | 787.20 |
| 14 | 1160.04 | 50.27 | 4.48 | 54.75 | 1155.56 | 50 | 787.20 | 34.11 | 20.64 | 54.75 | 766.57 |
| 15 | 1155.56 | 50.07 | 4.68 | 54.75 | 1150.88 | 51 | 766.57 | 33.22 | 21.53 | 54.75 | 745.03 |
| 16 | 1150.88 | 49.87 | 4.88 | 54.75 | 1146.00 | 52 | 745.03 | 32.28 | 22.47 | 54.75 | 722.57 |
| 17 | 1146.00 | 49.66 | 5.09 | 54.75 | 1140.91 | 53 | 722.57 | 31.31 | 23.44 | 54.75 | 699.13 |
| 18 | 1140.91 | 49.44 | 5.31 | 54.75 | 1135.60 | 54 | 699.13 | 30.30 | 24.45 | 54.75 | 674.67 |
| 19 | 1135.60 | 49.21 | 5.54 | 54.75 | 1130.06 | 55 | 674.67 | 29.24 | 25.51 | 54.75 | 649.16 |
| 20 | 1130.06 | 48.97 | 5.78 | 54.75 | 1124.28 | 56 | 649.16 | 28.13 | 26.62 | 54.75 | 622.54 |
| 21 | 1124.28 | 48.72 | 6.03 | 54.75 | 1118.25 | 57 | 622.54 | 26.98 | 27.77 | 54.75 | 594.77 |
| 22 | 1118.25 | 48.46 | 6.29 | 54.75 | 1111.96 | 58 | 594.77 | 25.77 | 28.98 | 54.75 | 565.79 |
| 23 | 1111.96 | 48.18 | 6.57 | 54.75 | 1105.39 | 59 | 565.79 | 24.52 | 30.23 | 54.75 | 535.56 |
| 24 | 1105.39 | 47.90 | 6.85 | 54.75 | 1098.54 | 60 | 535.56 | 23.21 | 31.54 | 54.75 | 504.02 |
| 25 | 1098.54 | 47.60 | 7.15 | 54.75 | 1091.40 | 61 | 504.02 | 21.84 | 32.91 | 54.75 | 471.11 |
| 26 | 1091.40 | 47.29 | 7.46 | 54.75 | 1083.94 | 62 | 471.11 | 20.41 | 34.34 | 54.75 | 436.77 |
| 27 | 1083.94 | 46.97 | 7.78 | 54.75 | 1076.16 | 63 | 436.77 | 18.93 | 35.82 | 54.75 | 400.95 |
| 28 | 1076.16 | 46.63 | 8.12 | 54.75 | 1068.05 | 64 | 400.95 | 17.37 | 37.38 | 54.75 | 363.57 |
| 29 | 1068.05 | 46.28 | 8.47 | 54.75 | 1059.58 | 65 | 363.57 | 15.75 | 39.00 | 54.75 | 324.58 |
| 30 | 1059.58 | 45.92 | 8.83 | 54.75 | 1050.74 | 66 | 324.58 | 14.07 | 40.68 | 54.75 | 283.89 |
| 31 | 1050.74 | 45.53 | 9.22 | 54.75 | 1041.53 | 67 | 283.89 | 12.30 | 42.45 | 54.75 | 241.44 |
| 32 | 1041.53 | 45.13 | 9.62 | 54.75 | 1031.91 | 68 | 241.44 | 10.46 | 44.29 | 54.75 | 197.16 |
| 33 | 1031.91 | 44.72 | 10.03 | 54.75 | 1021.87 | 69 | 197.16 | 8.54 | 46.21 | 54.75 | 150.95 |
| 34 | 1021.87 | 44.28 | 10.47 | 54.75 | 1011.41 | 70 | 150.95 | 6.54 | 48.21 | 54.75 | 102.74 |
| 35 | 1011.41 | 43.83 | 10.92 | 54.75 | 1000.48 | 71 | 102.74 | 4.45 | 50.30 | 54.75 | 52.44 |
| 36 | 1000.48 | 43.35 | 11.40 | 54.75 | 989.09 | 72 | 52.44 | 2.27 | 52.48 | 54.75 | -0.03 |
| | | | | | | Total of 72 equal monthly payments | | | | 3942 | |

The real, hands on work has been estimated at roughly $1.2B. In viewing the K-H contract value (roughly $3.9B, without fee), and assuming yearly funding of $657M, retiring this hands on work (i.e., prinicpal) under these conditions results in a computed interest rate (i.e., carrying charges) of 52%. Although the assumed conditions are not exactly the same as the closure project, they are close enough to illustrate the importance of (a) attempting to reduce the interest rate (i.e., simplify work practices), and (b) making principal payments on time (i.e., do not slip in accomplishing the real work).

# Appendix C

# Project Control System

## Project Control System

Kaiser-Hill (K-H) has implemented a comprehensive Project Control System Description (PCSD) for all Rocky Flats Closure Project work scope activities under their scope of work. The PCSD outlines baseline development for cost and schedule, monitoring project performance, and baseline change management. Specific requirements are detailed in the Strategic Planning & Integration (SP&I) Project Management and Control System Electronic Manual (eManual). The eManual provides the information necessary to comprehend and perform the functions required by the PCSD. Both the PCSD and eManual are available interactively to K-H and RFFO through the Intranet application base on the Rocky Flats website. In addition, other key Project Control databases are available through JOSHUA including the Basis of Estimate System (BEST) for cost estimates and the Planning and Integration Reporting System (PIRS), which includes cost performance data and is capable of generating Cost Performance Reports for individual user needs.

The K-H Project Control System was reviewed with the K-H Project Control Manager and Scheduling Manager. Evaluations included discussions against benchmark criteria required for an effective performance measurements system:

- Organization
- Planning and Budgeting
- Accounting
- Analysis
- Revisions

Organization: The project is organized using a Work Breakdown Structure (WBS), which provides a common basis for cost estimating, cost and schedule budgeting and performance measurement. Responsibilities are also identified against WBS elements.

Planning and Budgeting: This effort is based on activity schedule development by WBS. Results including relationships were input into the Primavera Project Planner (P3). Initially, K-H activities were scheduled to support a 2005 Working Plan Closure. Implementing Monte Carlo risk analysis against the P3 activities approximated and were used as the basis for the 12/15/06 Baseline Schedule. K-H monitors activities in the 2005 Working Plan and reports progress and remaining duration against the 2006 Baseline Schedule.

Cost budgeting is based on the cost estimate for the 2005 Working Plan, resource loaded into P3 and periodically levelized with K-H contingency in support of annual funding targets. Cost budgeting against schedule activities occurs down to Cost Account levels within each K-H project. Cost Accounts are the responsibility of Cost Account Managers. More detailed schedules have been developed within the projects below the project level and provide an effective basis for day-to-day work progress and performance measurement using prescribed earned value techniques.

Accounting: Actual costs are provided from the K-H Peoplesoft financial system and posted directly into PIRS. Individual projects are also responsible for providing schedule and cost status including earned value into PIRS. Other than level of effort (LOE) activities, which earn value based on the plan, there are by contract, pre-determined work activities, which for the majority, do not earn full value until the activity is completed. The Planning and Integration Group (P&I) reviews all information and prepares monthly progress report input with RFFO counterparts as well as required quarterly reports. Results of performance measurement are available interactively to K-H and RFFO on the website. Schedule status in P3 is available to personnel with P3 software. This includes K-H, but not RFFO. The reason is that RFFO does not have P3. It is therefore recommended that RFFO obtain the necessary software licenses for direct interface rather than relying on requests to K-H for reports.

Analysis: Variance analysis is the primary tool used by K-H to measure performance, and to monitor and resolve problem areas. Cost and schedule variances as well as trend analysis are identified by each PBD using earned value techniques base on predetermined work activities for deliverables and earned value set equal to plan for level of effort activities in accordance with standard performance measurement guidelines. K-H's predetermined work activities were reviewed and found to include the necessary benchmarks for measuring performance against project deliverables such as completion of sets and areas, module deactivation, completion of decommissioning and demolition. Concurrence is also provided by RFFO counterparts regarding completion of these deliverables. This provides an effective basis for determining earned value and incentive fee payments.

Revisions: Changes are input into PIRS and controlled by P&I. Requests for Equitable Adjustment (REA's) are entered by individual project into the system including costs and schedule activities. The proposed changes are controlled off-line, but evaluated against on-line project costs and schedule to identify impacts and recommended workarounds. REA's are continually monitored by P&I and only incorporated into the baseline when approved.

**Evaluation of Project Control System**

The K-H Strategic Planning and Integration group has developed and implemented a comprehensive Project Control system for their scope, responsive to DOE performance measurement criteria. The system includes databases, which are flexible enough to interactively provide data and reports through the website to K-H and DOE, and at the same time control data integrity, consistent performance measurement and reporting.

Regarding the P3 schedule, more than 11,000 activities have been identified and grouped by individual Project Baseline Descriptions (PBD's) A through J in support of the 12/15/06 Baseline Interim Closure Date. As noted, K-H has also implemented an internal P3 Working Plan Schedule targeting an accelerated 12/15/05 completion date. The Working Plan is K-H's day-to-day schedule used to monitor progress. Activities are

statused with actual start dates, remaining durations to complete work and actual finish dates. This information is then reported against the 2006 Baseline. The 2006 Baseline Schedule provides a reasonable level of visibility for K-H's scope including internal relationships between PBD's and visibility to K-H's status including the critical path through all PBD's necessary to meet 12/15/06. However, the 2006 Baseline Schedule is not yet fully integrated because critical DOE, EM-33 GFS/I including TRU waste and SNM activities and their relationships to K-H activities have not been established with the K-H schedule either by direct ties or milestone relationships to K-H activities.

Based on a Memorandum-of-Understanding (MOU), the Rocky Flats Program Office (RFPO,EM-33) at DOE Headquarters has an integral role in the project to provide extensive Government Furnished Services and Items (GFS/I) including containers, certifications and SST's. This involves close coordination with other DOE departments, facilities and National Laboratories to plan and schedule activities from those areas to support the project. EM-33 is chartered with integration support for the project and is developing a part of an Integrated Closure Project Baseline (ICPB) document, which provides discipline, formality, and structure to the planning, documentation, execution and tracking of DOE responsibilities and contract commitments to K-H.

EM-33 has completed considerable development of the ICPB including detailed P3 schedules integrating all external activities required to support K-H activities. Completion of the ICPB including development of a Project Management Plan and Performance Measurement System Description is projected in June 2001. Some GFS/I activities have been directly interfaced to the K-H schedules including those required for low level wastes. These are not a problem. However, the majority of critical GFS/I are shown as dates against requirement dates provided contractually by K-H. These appear with further explanation and are statused using an interface management list. The result in many cases is GFS/I which do not support the K-H need dates. Further, the origin of the K-H need dates is unclear as to whether they are from the 2005 Working Plan, the 2006 Baseline or other sources.

Actions and discussions are underway between EM-33 and K-H to resolve problem areas. KH, in some cases, is developing more detailed activities from summary level activities to define a sequence of need dates rather than all input required up front. EM-33 is actively coordinating with other external DOE departments and National Labs to improve dates. EM-33 targets completion of GFS/I schedules by the end of May. K-H Material Stewardship, (PBD F), is currently re-baselining activities for incorporation into the schedule to include sequencing of requirements for interface with GFS/I activities. Activities are also being re-scheduled based on revised packaging and certification requirements. Many were completed out of sequence because paperwork was complete and materials could be shipped. An orderly plan of work must now be re-established to meet project milestones. It is recommended that all efforts for EM-33 and Material Stewardship be accelerated for completion by 7/1/01.

The current K-H project schedule includes a satisfactory level of activities for performance measurement of activities using the lower level detailed activities monitored

by the individual projects. Relationships have been established in the schedule. However, some result in large positive total floats greater than 6 months for each project, excluding level of effort activities. These positive floats have been identified to K-H and RFFO, and should be reviewed to confirm established relationships. Revised ties might result in considerably less float available to complete tasks, especially for the 2005 working plan schedule.

Regarding critical path activities, the most negative critical total float paths were reviewed. These occur in PBD A, B371/374, PBD F, Material Stewardship. Zero critical total float paths were also reviewed. These occur from PBD E, Industrial Complex/Site Services activities through PBD G, Environmental Remediation activities to the 12/15/06 interim closure Baseline completion milestone. Figure C-1 provides a P3 schedule for these critical path activities and is based on K-H status as of 4/23/01 against the 2006 Baseline. The current status activities are shown on top as wide bars. Target Baseline 2006 schedule activities are shown by narrower, black bars below the status activities.

In PBD A, B371/374, there are schedule delays in excess of 5 months total negative float. Although impacting Protected Area Closure, these activities are not yet delaying the 2006 Baseline closure date. The contract provides considerable flexibility to K-H for developing and scheduling workarounds such as completion of other activities around PuSPS operations, which occupy a relatively small area in the building. Once confirmed and then replanned, a total positive float should still support workarounds. This would provide schedule windows to support completion of PuSPS at a later date, potentially avoiding impact to future activities that would have to be completed concurrently with PuSPS.

The second and most critical negative total float paths are in PBD F, Material Stewardship, with up to 7 months delay against closure of the reduced protected area. This is due to up-front delays in certification, fabrication and delivery of 9975 containers. As noted, EM-33 is completing GFS/I activities and coordinating the effort with Material Stewardship. Material Stewardship is also re-baselining their schedule. Accelerated completion of both efforts and integration of K-H and GFS/I activities has been recommended for 7/1/01 to resolve this criticality and provide a fully integrated project schedule for effective progress monitoring and performance measurement.

The current zero total float path is through PBD E, Industrial Complex/Site Services, and completion of demolition for the major industrial zone and remaining ISS facility activities to PBD G, Environmental Remediation, activities for completion of industrial area regrading and revegetation. The start work constraint for facility group 15 cluster property removal on 10/1/04 causes this zero total float path. These activities should be reviewed for acceleration not only to remove the non-critical nature of this work from the critical path, but also to reduce landlord costs shown by precedent PBD E activities from Baseline start through 9/30/04.

In addition to the overall project, each project was reviewed with K-H project controls personnel. They have developed detailed schedules and costs below the level of the

project schedule, which support the project schedule and conform to guidelines in the eManual. These are used on a day to day basis for monitoring and coordinating results not only within, but also between projects as necessary. However, methods vary from project to project including how information is shared between projects. As a result, it is recommended that project control procedures or guidelines be developed and implemented for a graded approach to each project and between projects. This will provide a basis for consistent performance measurement and coordination basis with RFFO.

Regarding GFS/I, it is not EM-33's intent to be a site, but rather continue as the support function integrator with RFFO implementing and monitoring interfaces to K-H activities. EM-33 will continue to status activities external to K-H. There are two areas of concern associated with this. First, the RFFO is not organized and does not have the necessary procedures, guidelines, Primavera software and project controls staff in place to effectively monitor interface of GFS/I activities even though there is one person in the RFFO responsible for GFS/I status. This concern is further expanded to day-to-day coordination between the RFFO and respective PBD's. RFFO is integrated with K-H at upper management levels. However, more emphasis should be placed on lower level integration. A more active role has started technically at this level in coordination and monthly reporting of projects by RFFO counterparts. With an expanded project controls staff, which could be based on attrition of other staff members, RFFO could actively participate with K-H project controls counterparts on each project in regular reviews of detailed schedules and cost. This would facilitate problem resolution and provide a basis for pro-active involvement rather than involvement in a reactionary mode, which has the potential to delay schedules and result in additional cost. There should also be RFFO guidelines and procedures for minimum monthly coordination and performance measurement between DOE and K-H PBD counterparts including requirements for resolution and documentation of problems as well as documented identification of any potential areas of risk within projects.

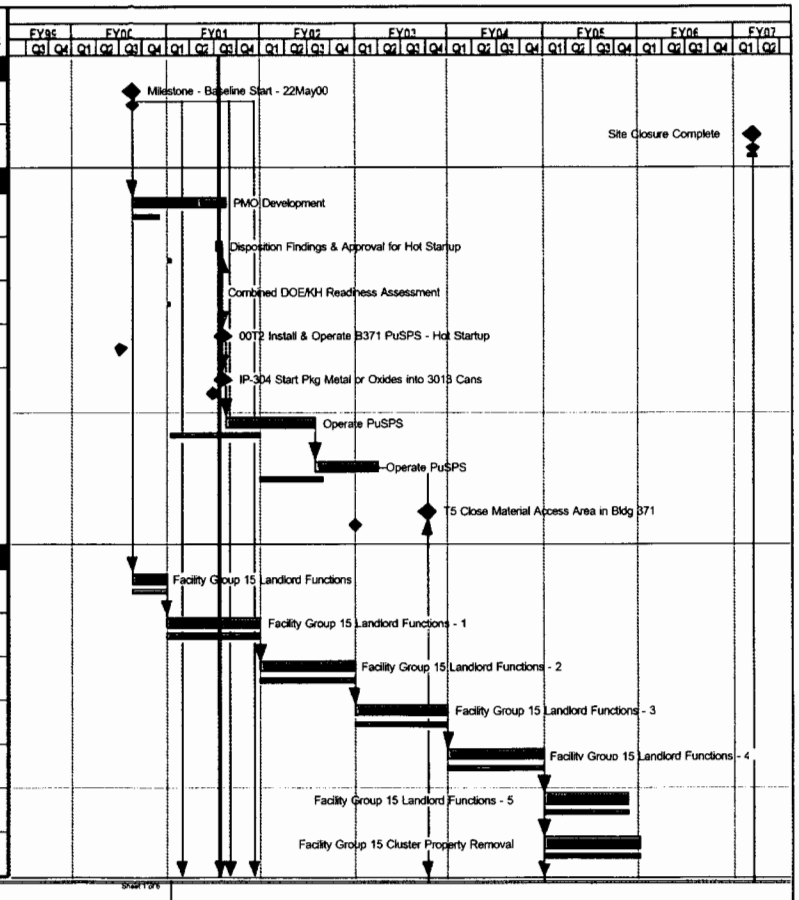
The second area of concern is EM-33. The headquarters staff, even though they have been doing an exemplary job, are very limited in staff and therefore, not in a position to effectively monitor the project as GFS/I activities are identified and interfaced to K-H activities. Dual roles have been defined for EM-33 technical personnel to monitor cost and schedule related to technical issues. However, their interface with cost and schedule performance is limited and should be covered by project control personnel experienced in those areas. Recognizing the contractual importance of GFS/I activities, the EM-33 staff should be expanded and have day-to-day representation at site. If not possible, the effort should be interfaced through RFFO, who would then actively partner with K-H PBD counterparts in a full working team relationship with balanced levels of similar representation from each team. The entire effort, its integration, and lines of responsibility should be clearly defined in a Project Execution Plan (PEP) developed by an integrated project team.

Additionally, EM-33 must be able to quickly resolve problems related to GFS/I involving critical activities required from other external DOE members such as the National

Laboratories. Current lines of responsibility could result in slower problem resolution. Therefore, it is recommended that EM-33 report to either EM-1 or EM-2.

Completion of the integrated schedule with pro-active management and an enhanced team effort between RFFO and K-H will facilitate closure within the current target schedule. The above actions including RFFO project controls personnel interacting with K-H counterparts in an environment defined by policies, procedures and responsibility lines in the PEP to be developed and implemented by RFFO will achieve this goal. In addition, both RFFO and K-H undertaking a concerted effort to simplify and enhance work requirement practices will further improve schedule and cost without compromising safety.

| Activity ID | Activity Description | Orig Dur | Early Start | Early Finish | Total Float |
|---|---|---|---|---|---|
| 1ZFY200001 | Milestone - Baseline Start - 22May00 | 0 | 22MAY00A | | |
| 1ZMMILE099 | Site Closure Complete | 0 | | 14DEC06 | 0 |
| 1AFBB30000 | PMO Development | 63 | 22MAY00A | 18MAY01 | -127 |
| 1AFDD50000 | Disposition Findings & Approval for Hot Startup | 6 | 09APR01A | 07MAY01 | -118 |
| 1AFDD70000 | Combined DOE/KH Readiness Assessment | 13 | 16APR01A | 27APR01 | -118 |
| 1AFMILE600 | 00T2 Install & Operate B371 PuSPS - Hot Startup | 0 | | 07MAY01 | -118 |
| 1AFMILE700 | IP-304 Start Pkg Metal or Oxides into 3013 Cans | 0 | | 07MAY01 | -118 |
| 1AFZZ10000 | Operate PuSPS | 239 | 21MAY01 | 29APR02 | -127 |
| 1AFZZ20000 | Operate PuSPS | 170 | 30APR02 | 31DEC02 | -37 |
| 1AQMILE303 | T5 Close Material Access Area in Bldg 371 | 0 | | 09JUL03 | -152 |
| 1EFB0515 | Facility Group 15 Landlord Functions | 82 | 22MAY00A | 28SEP00A | |
| 1EFB0520 | Facility Group 15 Landlord Functions - 1 | 227* | 02OCT00A | 27SEP01 | 0 |
| 1EFB0525 | Facility Group 15 Landlord Functions - 2 | 228 | 01OCT01 | 30SEP02 | 0 |
| 1EFB0530 | Facility Group 15 Landlord Functions - 3 | 228 | 01OCT02 | 30SEP03 | 0 |
| 1EFB0535 | Facility Group 15 Landlord Functions - 4 | 229 | 01OCT03 | 30SEP04 | 0 |
| 1EXXXB0535 | Facility Group 15 Landlord Functions - 5 | 200 | 01OCT04 | 17AUG05 | 0 |
| 1EFC0225 | Facility Group 15 Cluster Property Removal | 229 | 01OCT04 | 03OCT05 | 0 |

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Data Date 23APR01
Run Date 24MAY01 08:42

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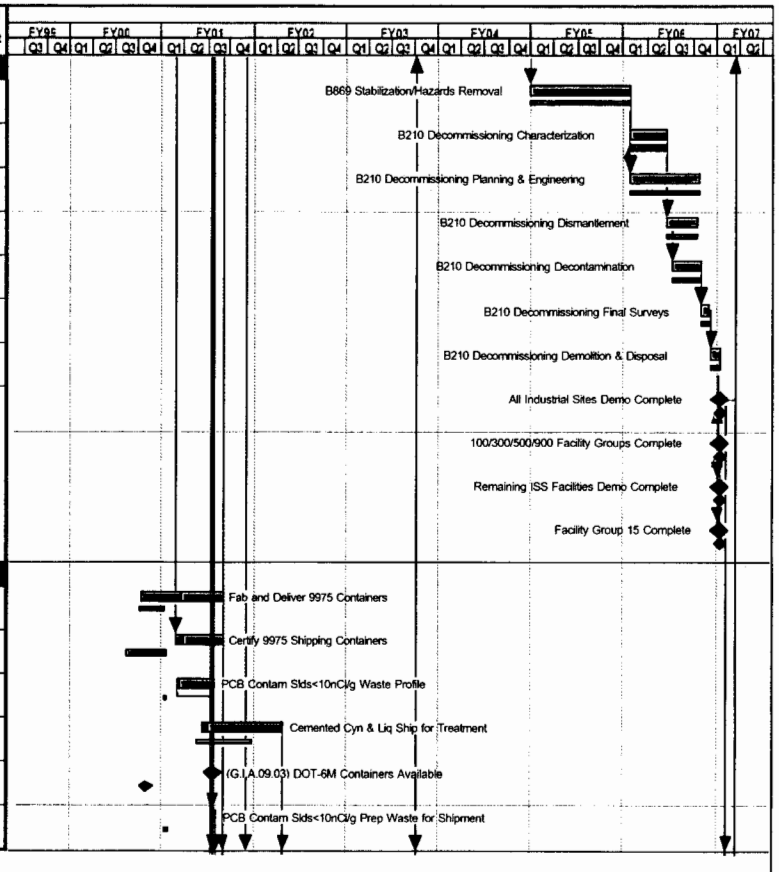
Closure Project Baseline 2006

Most Critical Negative Total Float Paths (PBD A + F)
and
Zero Critical Paths (PBD E + G) to 12/14/06 Baseline Completion

Burns and Roe Enterprises, Inc.
DOE - External Independent Review
Rocky Flats Closure Project

| Activity ID | Activity Description | Orig Dur | Early Start | Early Finish | Total Float |
|---|---|---|---|---|---|
| [illegible] | | | | | |
| 1EFC0240 | B869 Stabilization/Hazards Removal | 242 | 01OCT04 | 24OCT05 | 0 |
| 1EFD4590 | B210 Decommissioning Characterization | 93 | 25OCT05 | 22MAR06 | 0 |
| 1EFD4585 | B210 Decommissioning Planning & Engineering | 170 | 25OCT05 | 24JUL06 | 0 |
| 1EFD4605 | B210 Decommissioning Dismantlement | 74 | 23MAR06 | 19JUL06 | 0 |
| 1EFD4600 | B210 Decommissioning Decontamination | 74 | 10APR06 | 03AUG06 | 0 |
| 1EFD4595 | B210 Decommissioning Final Surveys | 22 | 04AUG06 | 07SEP06 | 0 |
| 1EFD4610 | B210 Decommissioning Demolition & Disposal | 21 | 11SEP06 | 11OCT06 | 0 |
| 1EAMILE093 | All Industrial Sites Demo Complete | 0 | | 11OCT06 | 0 |
| 1EEND1359 | 100/300/500/900 Facility Groups Complete | 0 | | 11OCT06 | 0 |
| 1EENDISS | Remaining ISS Facilities Demo Complete | 0 | | 11OCT06 | 0 |
| 1EFEND15CL | Facility Group 15 Complete | 0 | | 11OCT06 | 0 |
| [illegible] | | | | | |
| 1FCE997500 | Fab and Deliver 9975 Containers | 48 | 17JUL00A | 01JUN01 | -131 |
| 1FCE9975C0 | Certify 9975 Shipping Containers | 26 | 27NOV00A | 01JUN01 | -138 |
| 1FBCC22B40 | PCB Contam Slds<10nCi/g Waste Profile | 10 | 04DEC00A | 02MAY01 | -118 |
| 1FBCC26B55 | Cemented Cyn & Liq Ship for Treatment | 222 | 15MAR01A | 26JAN02 | -118 |
| 1FCEC40015 | (G.I.A.09.03) DOT-6M Containers Available | 0 | 23APR01 | | -162 |
| 1FBCC22B45 | PCB Contam Slds<10nCi/g Prep Waste for Shipment | 15 | 23APR01 | 07MAY01 | -118 |

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Data Date 23APR01
Run Date 24MAY01 08:42

Sheet 2 of 6

Closure Project Baseline 2006

Most Critical Negative Total Float Paths (PBD A + F)
and
Zero Critical Paths (PBD E + G) to 12/14/06 Baseline Completion

Burns and Roe Enterprises, Inc.
DOE - External Independent Review
Rocky Flats Closure Project

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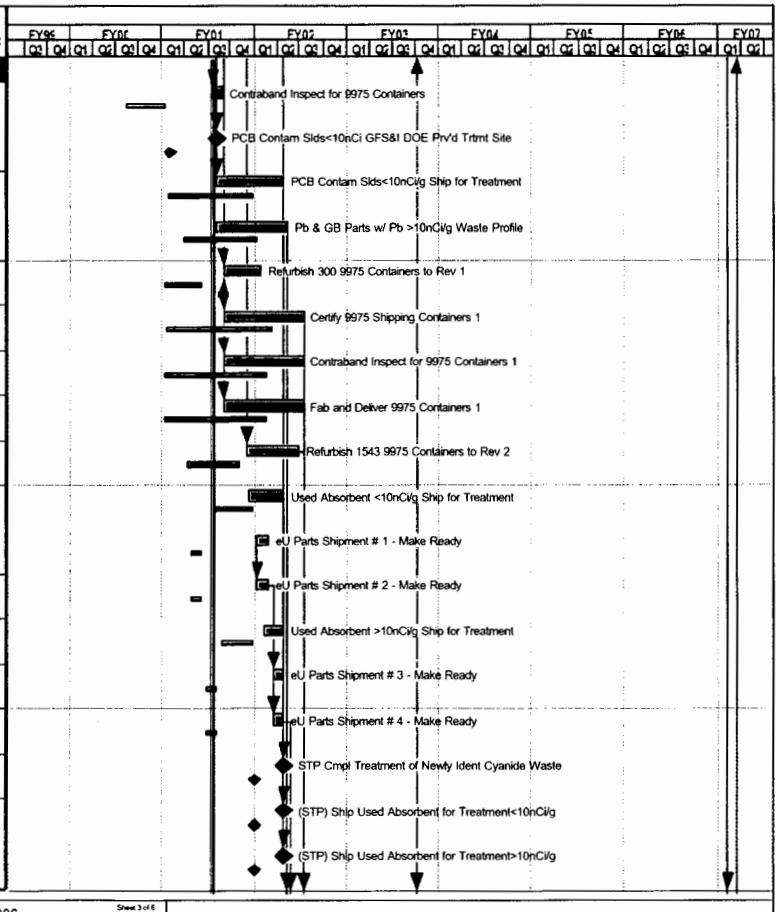
| Activity ID | Activity Description | Orig Dur | Early Start | Early Finish | Total Float |
|---|---|---|---|---|---|
| 1FCEINP100 | Contraband Inspect for 9975 Containers | 26 | 23APR01 | 01JUN01 | -135 |
| 1FBCC22B50 | PCB Contam Slds<10nCi GFS&I DOE Prv'd Trtmt Site | 0 | | 07MAY01 | -118 |
| 1FBCC22B55 | PCB Contam Slds<10nCi/g Ship for Treatment | 264 | 08MAY01 | 26JAN02 | -118 |
| 1FBCC05B40 | Pb & GB Parts w/ Pb >10nCi/g Waste Profile | 279 | 08MAY01 | 10FEB02 | -133 |
| 1FCE9975RB | Refurbish 300 9975 Containers to Rev 1 | 92 | 04JUN01 | 25OCT01 | -124 |
| 1FCE9975C1 | Certify 9975 Shipping Containers 1 | 201 | 04JUN01 | 19APR02 | -138 |
| 1FCEINP200 | Contraband Inspect for 9975 Containers 1 | 201 | 04JUN01 | 19APR02 | -135 |
| 1FCE997501 | Fab and Deliver 9975 Containers 1 | 201 | 04JUN01 | 19APR02 | -131 |
| 1FCE99RB01 | Refurbish 1543 9975 Containers to Rev 2 | 127 | 07SEP01 | 28MAR02 | -124 |
| 1FBCC10A55 | Used Absorbent <10nCi/g Ship for Treatment | 142 | 08SEP01 | 27JAN02 | -119 |
| 1FCEE50100 | eU Parts Shipment # 1 - Make Ready | 26 | 15OCT01 | 26NOV01 | -162 |
| 1FCEE50200 | eU Parts Shipment # 2 - Make Ready | 26 | 15OCT01 | 26NOV01 | -162 |
| 1FBCC10B55 | Used Absorbent >10nCi/g Ship for Treatment | 81 | 09NOV01 | 28JAN02 | -120 |
| 1FCEE50300 | eU Parts Shipment # 3 - Make Ready | 26 | 19DEC01 | 30JAN02 | -162 |
| 1FCEE50400 | eU Parts Shipment # 4 - Make Ready | 26 | 19DEC01 | 30JAN02 | -162 |
| 1FBCC26B60 | STP Cmpl Treatment of Newly Ident Cyanide Waste | 0 | | 26JAN02 | -118 |
| 1FBCC10A60 | (STP) Ship Used Absorbent for Treatment<10nCi/g | 0 | | 27JAN02 | -119 |
| 1FBCC10B60 | (STP) Ship Used Absorbent for Treatment>10nCi/g | 0 | | 28JAN02 | -120 |

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Sheet 3 of 6

Closure Project Baseline 2006

Most Critical Negative Total Float Paths (PBD A + F)
and
Zero Critical Paths (PBD E + G) to 12/14/06 Baseline Completion

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Rocky Flats Closure Project

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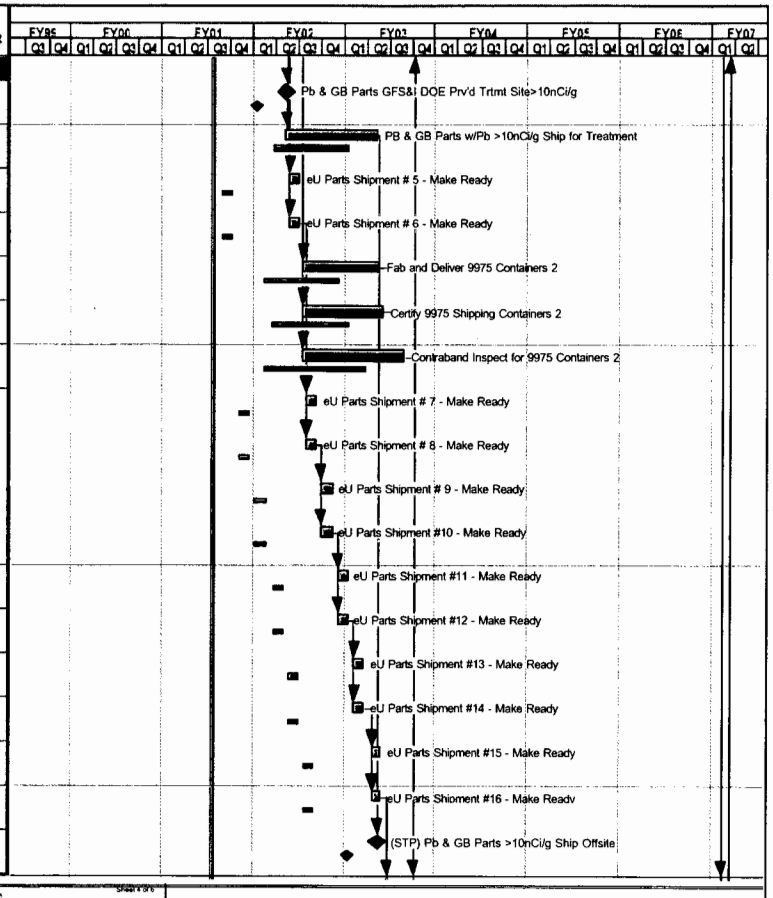
| Activity ID | Activity Description | Orig Dur | Early Start | Early Finish | Total Float |
|---|---|---|---|---|---|
| 1FBCC05B50 | Pb & GB Parts GFS&I DOE Prv'd Trtmt Site>10nCi/g | 0 | | 10FEB02 | -133 |
| 1FBCC05B56 | PB & GB Parts w/Pb >10nCi/g Ship for Treatment | 365 | 11FEB02 | 10FEB03 | -133 |
| 1FCEE50500 | eU Parts Shipment # 5 - Make Ready | 26 | 25FEB02 | 04APR02 | -162 |
| 1FCEE50600 | eU Parts Shipment # 6 - Make Ready | 26 | 25FEB02 | 04APR02 | -162 |
| 1FCE997502 | Fab and Deliver 9975 Containers 2 | 189 | 22APR02 | 19FEB03 | -131 |
| 1FCE9975C2 | Certify 9975 Shipping Containers 2 | 196 | 22APR02 | 03MAR03 | -138 |
| 1FCEINP300 | Contraband Inspect for 9975 Containers 2 | 250 | 22APR02 | 27MAY03 | -135 |
| 1FCEE50700 | eU Parts Shipment # 7 - Make Ready | 26 | 30APR02 | 10JUN02 | -162 |
| 1FCEE50800 | eU Parts Shipment # 8 - Make Ready | 26 | 30APR02 | 10JUN02 | -162 |
| 1FCEE50900 | eU Parts Shipment # 9 - Make Ready | 26 | 03JUL02 | 13AUG02 | -162 |
| 1FCEE51000 | eU Parts Shipment #10 - Make Ready | 26 | 03JUL02 | 13AUG02 | -162 |
| 1FCEE51100 | eU Parts Shipment #11 - Make Ready | 26 | 09SEP02 | 17OCT02 | -162 |
| 1FCEE51200 | eU Parts Shipment #12 - Make Ready | 26 | 09SEP02 | 17OCT02 | -162 |
| 1FCEE51300 | eU Parts Shipment #13 - Make Ready | 26 | 12NOV02 | 24DEC02 | -162 |
| 1FCEE51400 | eU Parts Shipment #14 - Make Ready | 26 | 12NOV02 | 24DEC02 | -162 |
| 1FCEE51500 | eU Parts Shipment #15 - Make Ready | 26 | 21JAN03 | 27FEB03 | -162 |
| 1FCEE51600 | eU Parts Shipment #16 - Make Ready | 26 | 21JAN03 | 27FEB03 | -162 |
| 1FBCC05B60 | (STP) Pb & GB Parts >10nCi/g Ship Offsite | 0 | | 10FEB03 | -133 |




Start Date 01FEB99
Finish Date 14DEC06
Data Date 23APR01
Run Date 24MAY01 08:43

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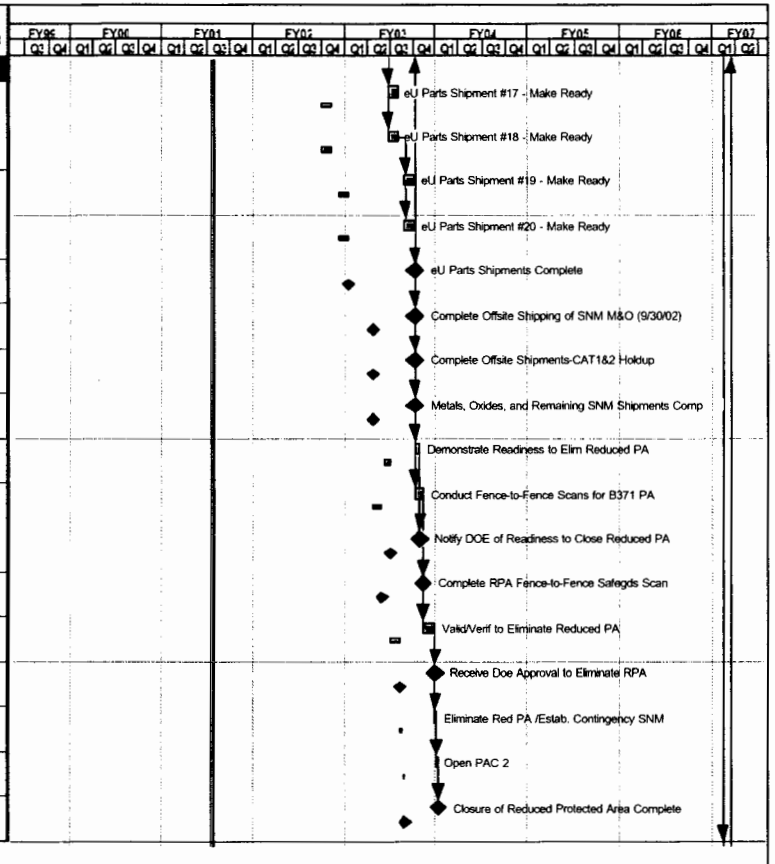
Closure Project Baseline 2006

Most Critical Negative Total Float Paths (PBD A + F)
and
Zero Critical Paths (PBD E + G) to 12/14/06 Baseline Completion

Burns and Roe Enterprises, Inc.
DOE - External Independent Review
Rocky Flats Closure Project

| Activity ID | Activity Description | Orig Dur | Early Start | Early Finish | Total Float |
|---|---|---|---|---|---|
| [redacted] | | | | | |
| 1FCEE51700 | eU Parts Shipment #17 - Make Ready | 26 | 25MAR03 | 02MAY03 | -162 |
| 1FCEE51800 | eU Parts Shipment #18 - Make Ready | 26 | 25MAR03 | 02MAY03 | -162 |
| 1FCEE51900 | eU Parts Shipment #19 - Make Ready | 26 | 29MAY03 | 09JUL03 | -162 |
| 1FCEE52000 | eU Parts Shipment #20 - Make Ready | 26 | 29MAY03 | 09JUL03 | -162 |
| 1FCEE59000 | eU Parts Shipments Complete | 0 | | 09JUL03 | -162 |
| 1FCEMIL295 | Complete Offsite Shipping of SNM M&O (9/30/02) | 0 | | 09JUL03 | -162 |
| 1FCEMIL296 | Complete Offsite Shipments-CAT1&2 Holdup | 0 | | 09JUL03 | -162 |
| 1FCEMIL049 | Metals, Oxides, and Remaining SNM Shipments Comp | 0 | | 09JUL03 | -152 |
| 1FCFRPA400 | Demonstrate Readiness to Elim Reduced PA | 12 | 10JUL03 | 28JUL03 | -152 |
| 1FCFRPA350 | Conduct Fence-to-Fence Scans for B371 PA | 22 | 10JUL03 | 12AUG03 | -162 |
| 1F9MILE314 | Notify DOE of Readiness to Close Reduced PA | 0 | 29JUL03 | | -152 |
| 1F9MILE302 | Complete RPA Fence-to-Fence Safegds Scan | 0 | | 12AUG03 | -162 |
| 1FCFRPA500 | Valid/Verif to Eliminate Reduced PA | 28 | 13AUG03 | 25SEP03 | -162 |
| 1FCFDOE800 | Receive Doe Approval to Eliminate RPA | 0 | | 25SEP03 | -162 |
| 1FCFRPA600 | Eliminate Red PA /Estab. Contingency SNM | 6 | 29SEP03 | 06OCT03 | -162 |
| 1FCFRPA700 | Open PAC 2 | 4 | 07OCT03 | 13OCT03 | -162 |
| 1F9MILE301 | Closure of Reduced Protected Area Complete | 0 | | 13OCT03 | -162 |




Start Date 01FEB99
Finish Date 14DEC06
Data Date 23APR01
Run Date 24MAY01 08:43

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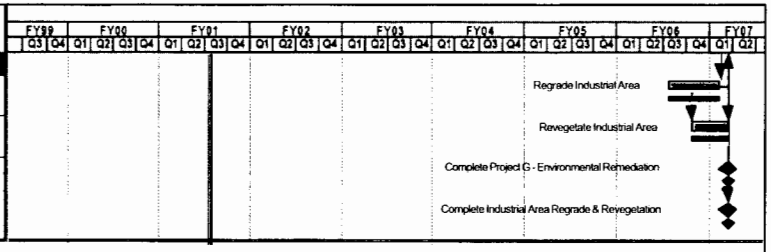
C107 Sheet 5 of 6

Closure Project Baseline 2006

Most Critical Negative Total Float Paths (PBD A + F)
and
Zero Critical Paths (PBD E + G) to 12/14/06 Baseline Completion

Burns and Roe Enterprises, Inc.
DOE - External Independent Review
Rocky Flats Closure Project

| Activity ID | Activity Description | Orig Dur | Early Start | Early Finish | Total Float |
|---|---|---|---|---|---|
| 1GEPER5030 | Regrade Industrial Area | 125 | 27APR06 | 10NOV06 | 0 |
| 1GEPER5040 | Revegetate Industrial Area | 94 | 19JUL06 | 14DEC06 | 0 |
| 1GENDPROJG | Complete Project G - Environmental Remediation | 0 | | 14DEC06 | 0 |
| 1GMMILE550 | Complete Industrial Area Regrade & Revegetation | 0 | | 14DEC06 | 0 |




Start Date 01FEB99
Finish Date 14DEC06
Data Date 23APR01
Run Date 24MAY01 06:43

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Closure Project Baseline 2006

Most Critical Negative Total Float Paths (PBD A + F)
and
Zero Critical Paths (PBD E + G) to 12/14/06 Baseline Completion

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DOE - External Independent Review
Rocky Flats Closure Project

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# Appendix D

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| | Programmatic Risk Management Program at Rocky Flats **(Presentation)** |
| | Rocky Flats Contract Agreement (RFCA) **(Presentation)** With Copy of RFCA (Dated February 2000) |
| | ICPB Summary and Approach **(Presentation)** (Frank Sheppard – EM-33) |
| | PBD H & ISM Discussion **(Presentation)** (James Jeffries – RFFO) |
| | Rocky Flats Closure Contract **(Presentation)** (Charlie Dan and Tod Anderson – RFFO) |
| | Kaiser-Hill (KH) Project Control System – External Independent Review, Earned Value Reporting **(Presentation)** (Bill Harroun – KH) |
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| | The Closure Project Baseline (CPB) – Strategic Planning and Integration **(Presentation)** (Nancy Tuor – KH) |
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| | Closure Project Work Breakdown Structure (Detailed Levels) **(Flow Chart)** (Created by Bill Harroun – KH) |
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| | RFCP System Integration Overview **(Flow Chart)** (Created by Bill Harroun – KH) |
| | Work Breakdown Structure (WBS) and Responsible Authority Matrix (RAM) Database **(Flow Chart)** (Created by KH) |
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| | Task G, ER Site Activity Tracking List Spreadsheet |
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